

ABSTRACT

EFFECT OF CERTAIN PACKING FACTORS ON FROZEN STRAWBERRIES AND RASPBERRIES IN MICHIGAN AND OREGON

by Clifford Elroy Samuels

This investigation was made to provide more scientific information on the effect of certain packing factors on frozen sliced strawberries and frozen red raspberries. Berries from both Michigan and Oregon were used.

Data were obtained to show the effect of the following treatments on drained weights and soluble solids: (1) strength and amount of packing media, (2) size of container, and (3) partial replacement of sugar sirup with corn sirup. Additional data were obtained in Michigan with respect to: (4) the effect of thawing frozen sliced strawberries and frozen red raspberries by means of moving water and moving air, and (5) the effect of extended thaw-time in moving water on frozen sliced strawberries.

The results indicated that a loss of drained weights and soluble solids occurred in samples packed in a water medium and those in which there was no packing medium. In sirup and dry sugar samples there was a gain in drained weights and soluble solids. There was no difference in drained weights between 50° Brix and 60° Brix packs. With the exception of Michigan sliced strawberries, higher drained weights were obtained when maximum amounts of packing medium were used.

Clifford Elroy Samuels

Increasing the size of container resulted in the decrease of drained weight ratios and the increase of soluble solids in the thawed product (total blended mixture) and drained berries.

There was no difference in drained weights or soluble solids between sucrose sirup packs and sucrose corn sirup packs.

Drained weights were higher and soluble solids were lower when frozen sliced strawberries were thawed by means of moving water. There was no difference between thawing treatments on the drained weights or soluble solids of frozen red raspberries.

Drained weights of frozen sliced strawberries were lower when thaw-time was extended two hours with no additional decrease at the four hour level; soluble solids were unchanged at two hours and higher at the four hour level.

EFFECT OF CERTAIN PACKING FACTORS
ON FROZEN STRAWBERRIES AND RASPBERRIES
IN MICHIGAN AND OREGON

By

Clifford Elroy Samuels

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Food Science

1960

615191
6/25/61

ACKNOWLEDGMENTS

The author wishes to express his gratitude to Dr. C. L. Bedford for his constructive criticism and guidance throughout the course of this investigation. Sincere appreciation is extended to Professor W. F. Robertson for his suggestions and assistance.

Acknowledgment is due the Department of Food and Dairy Technology, Oregon State University for the use of the facilities in obtaining the Oregon data.

The assistance, generously and enthusiastically extended by Dr. Jerome C. R. Li, Chairman, Department of Statistics, Oregon State University, in the statistical analyses of data is greatly appreciated.

Much credit is due my wife, Emily, who not only helped throughout the experiment, but was my constant source of strength and inspiration. Her vast patience and constant encouragement have been greatly appreciated.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters.

2. The second part outlines the various methods and tools used to collect and analyze data. It mentions the use of surveys, interviews, and statistical software to gather information and identify trends.

3. The third part describes the process of interpreting the collected data and drawing meaningful conclusions. It highlights the need for critical thinking and the ability to distinguish between correlation and causation.

4. The fourth part discusses the ethical considerations surrounding data collection and analysis. It stresses the importance of obtaining informed consent and protecting the privacy of individuals whose data is being used.

5. The fifth part provides a summary of the key findings and recommendations from the study. It suggests that further research is needed to explore certain aspects of the topic in more detail.

6. The sixth part includes a list of references to the sources used in the research. These references provide additional context and support for the findings presented in the document.

7. The seventh part contains a list of appendices, which include supplementary information such as raw data, detailed calculations, and additional charts or graphs.

8. The eighth part is a concluding statement that reiterates the main purpose of the study and the significance of the results.

9. The ninth part is a list of footnotes, which provide additional details or clarifications for specific points mentioned in the main text.

10. The tenth part is a list of acknowledgments, where the author expresses gratitude to those who provided support or assistance during the research process.

DEDICATION

This thesis is dedicated to my father and mother,
Mr. and Mrs. Henry C. Samuels.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
REVIEW OF LITERATURE	6
Factors Affecting Drained Weights	8
Factors Affecting Soluble Solids	14
Proposed Federal Standards	18
MATERIALS AND METHODS	20
Raw Material	20
Sample Processing	20
Sample Analysis	23
Statistical Analyses	25
RESULTS AND DISCUSSION	26
Effect of Strength and Amount of Packing Media	27
Effect of Size of Container	43
Effect of Partial Replacement of Sugar Sirup with Corn Sirup	47
Effect of Thawing by Means of Moving Water and Moving Air	48
Effect of Extended Thaw-time in Moving Water	60
SUMMARY AND CONCLUSIONS	68
BIBLIOGRAPHY	71

[illegible]

EFFECT OF CERTAIN PACKING FACTORS
ON FROZEN STRAWBERRIES AND RASPBERRIES
IN MICHIGAN AND OREGON

INTRODUCTION

The frozen food industry is a comparatively young industry and one which has experienced a rapid growth. In order to insure continued growth and in order to improve the quality of the frozen product, there is a great need for the development of definitions and objective measures of quality. Despite the fact that many scientists have done research on frozen foods, more scientific data must be available before the frozen food industry, the Production and Marketing Administration, and the Federal Food and Drug Administration can establish objective measurements to aid in indicating quality. Therefore, this investigation was made to provide more scientific information on frozen sliced strawberries and frozen red raspberries.

Many able scientists have made careful studies of frozen foods. Some began their studies shortly after the turn of the century. In 1904, Fulton began work on frozen pie-fruits, and the freezing of "cold pack" strawberries took place in the Northwest as early as 1908. But regardless of these early attempts, it might be said that the quick freezing industry for retail trade, as we know it today, had its official birth about 1923 (30).

By the end of 1940 there was evidence of tremendous growth. An industry census showed that there were 2,641 wage earners in the frozen

food industry with annual wages of \$1.5 million. In March 1941, there were between 12,000 and 15,000 frozen food cabinets in retail stores.

By 1958, the industry census reported that there were over 300,000 wage earners and that the investment in the industry was over \$5 billion. At the time of the census there were over 375,000 stores with frozen food cabinets (30). These figures clearly indicate the rapid growth of the industry. Frozen foods are no longer considered novelty or luxury items but are regarded as economical and convenient staples.

During the earlier years of growth the controversy raged as to whether standards should be adopted for frozen foods. At the present time, Federal Food and Drug Administration standards have not been adopted.

A standard is defined as that which is set up and established by authority as a rule for the measure of quantity, weight, extent, value or quality. Growth of the industry has been so rapid and general, both geographically and in the variety and volume of products packed, that each section has proceeded largely according to its own ideas of production procedure, quality and packaging. Therefore, the frozen food industry needs standards for their products and, in the main, desires them, but data which are suitable for presentation as evidence in aiding and establishing fair and reasonable standards are still lacking in many cases. At the present time the United States grade standards of the Production and Marketing Administration are dependent upon the observations and judgment of trained inspectors. The Federal Food and Drug Administration published proposed frozen food standards in the Federal Register of October 1950.

- 1. The first step in the process of the scientific method is to ask a question or make an observation.
- 2. The second step is to do background research to see what has already been discovered.
- 3. The third step is to form a hypothesis, which is a prediction about what will happen.
- 4. The fourth step is to design an experiment to test the hypothesis.
- 5. The fifth step is to collect data and analyze the results.
- 6. The sixth step is to draw a conclusion based on the data.
- 7. The seventh step is to communicate the results to others.
- 8. The eighth step is to repeat the experiment to see if the results are consistent.
- 9. The ninth step is to use the results to make a new hypothesis or to refine an existing one.
- 10. The tenth step is to use the results to solve a problem or to make a discovery.

Follow up work has been published in the Journal of the Association of Official Agricultural Chemists in 1953, 1954, and 1955 by the Federal Food and Drug Administration. These standards have not been put into effect, which further indicates that additional data are necessary before the Federal Food and Drug Administration can actually promulgate the standards of quality which will be enforced.

It must be emphasized that establishment of standards without sufficient data and adequate knowledge of the processing methods necessary is extremely dangerous. For instance, in the November 1946 issue of "Frosted Food Field" there appeared an article about the 32nd National Conference on Weights and Measures sponsored by the United States Bureau of Standards. According to this article, the Committee on Methods of Sale of Commodities had submitted a report, adopted by conference delegates, part of which reads: "Instances are cited where, for instance, packers of frozen berries have by adding some sugar to water, taken the stand that they have created a sirup and, therefore, an edible food which they are allowed to declare in conjunction with the solids in the package. It needs no great stretch of the imagination to see how this will work out if the practice is allowed to continue in the frozen food industry. It is the belief and recommendation of the committee that frozen foods should be marked with the drained weight of the commodity entailed, and that any subsequent adding of moisture be left to the consumer."

From the above quotation it is obvious that the committee which formulated these recommendations had little knowledge of the processing methods necessary for the good keeping qualities of frozen fruit.

1. The first step in the process of the scientific method is to make an observation or ask a question. For example, a scientist might observe that a plant grows better in one type of soil than another. This leads to a question: "Does the type of soil affect the growth of a plant?"

2. Next, the scientist makes a hypothesis, which is an educated guess or prediction about the outcome of the experiment. In this case, the hypothesis might be: "If a plant is grown in rich soil, then it will grow taller than a plant grown in poor soil."

3. The third step is to design and conduct an experiment to test the hypothesis. The scientist would set up two groups of plants: one group in rich soil and one group in poor soil. They would then measure the height of the plants over a period of time.

4. After the experiment is complete, the scientist collects data and analyzes it. They might find that the plants in rich soil are indeed taller than the plants in poor soil, which supports the hypothesis.

5. Finally, the scientist draws a conclusion based on the results of the experiment. If the data supports the hypothesis, the scientist might conclude that the type of soil does affect the growth of a plant. If the data does not support the hypothesis, the scientist might revise the hypothesis and repeat the experiment.

6. The scientific method is a systematic approach to investigating a question or problem. It involves making observations, asking questions, forming hypotheses, conducting experiments, and drawing conclusions based on the results. This process is used by scientists in all fields of study to advance our understanding of the natural world.

7. One of the key features of the scientific method is that it is self-correcting. If a hypothesis is not supported by the results of an experiment, the scientist can revise the hypothesis and try again. This ensures that the scientific method is a reliable way to investigate the world around us.

8. The scientific method is also a collaborative process. Scientists often work together to design and conduct experiments, share their results, and discuss their findings. This helps to ensure that the results of the experiment are accurate and that the conclusions drawn are based on solid evidence.

9. In addition to the scientific method, there are other ways to investigate the world around us. For example, we can use our senses to observe the world, or we can use logic to reason about the world. However, the scientific method is the most reliable way to investigate the world because it is based on evidence and is self-correcting.

10. The scientific method is a powerful tool that has led to many of the great discoveries of the modern world. It is a process that is constantly evolving and improving, and it is one that we can all use to investigate the world around us.

Evidently the committee expected that a housewife could take defrosted, dry packed whole berries, add sweetened water and miraculously produce a colorful, firm, plump and delicious berry dessert. If the procedure they suggested were carried out, she would serve a soggy, faded, tasteless dish and very likely refuse to purchase any other frozen food product.

Standards should be promulgated with three points in mind:

(1) they must protect the consumer, (2) they must protect the packer, and (3) they must be such that the industry can meet them when the best procedures are used to process the best raw materials available. The industry knows that the consumer should be protected from poor quality food, and it also realizes that, if the consumer is not fully satisfied with frozen food products, the industry will be the first to suffer. Of equal importance, however, is the fact that when standards are applied to the industry for the benefit of the consumer these standards should be of such nature that they do not impose an undue hardship upon the industry.

This investigation was made to provide more scientific information on frozen sliced strawberries and frozen red raspberries. The Premier and Northwest varieties of strawberries were used in Michigan (1955) and Oregon (1956), respectively. The Taylor and Willamette varieties of red raspberries were used in Michigan (1954) and Oregon (1956), respectively.

Data were obtained in Michigan and Oregon to show the effects of certain packing factors on frozen sliced strawberries and frozen red

• Explain the importance of the following factors in the development of a country's economy:

- Human resources
- Capital resources
- Technology
- Government policy
- Infrastructure
- Trade
- Investment
- Education
- Health
- Environment

• Explain the importance of the following factors in the development of a country's economy:

• Human resources

• Capital resources

• Technology

• Government policy

• Infrastructure

• Trade

• Investment

• Education

• Health

• Environment

• Explain the importance of the following factors in the development of a country's economy:

• Human resources

• Capital resources

• Technology

• Government policy

• Infrastructure

• Trade

• Investment

• Education

• Health

• Environment

• Explain the importance of the following factors in the development of a country's economy:

• Human resources

• Capital resources

• Technology

• Government policy

• Infrastructure

• Trade

• Investment

• Education

• Health

• Environment

• Explain the importance of the following factors in the development of a country's economy:

• Human resources

• Capital resources

• Technology

• Government policy

• Infrastructure

• Trade

• Investment

• Education

• Health

• Environment

• Explain the importance of the following factors in the development of a country's economy:

• Human resources

• Capital resources

• Technology

• Government policy

• Infrastructure

• Trade

• Investment

• Education

• Health

• Environment

raspberries. These data showed the effect of the following treatments on drained weights and soluble solids: (1) strength and amount of packing media, (2) size of container, and (3) partial replacement of sugar sirup with corn sirup.

Additional data were obtained in Michigan with respect to:

(1) the effect of thawing frozen sliced strawberries and frozen red raspberries by means of moving water and moving air, and (2) the effect of extended thaw-time in moving water on frozen sliced strawberries.

• *Staphylococcus aureus* (Staph aureus) is a common cause of skin infections.

• *Streptococcus pyogenes* (Strep pyogenes) is a common cause of skin infections.

• *Streptococcus pneumoniae* (Strep pneumoniae) is a common cause of skin infections.

• *Streptococcus pyogenes* (Strep pyogenes)

• *Streptococcus pyogenes* (Strep pyogenes) is a common cause of skin infections.

• *Streptococcus pyogenes* (Strep pyogenes) is a common cause of skin infections.

• *Streptococcus pyogenes* (Strep pyogenes) is a common cause of skin infections.

• *Streptococcus pyogenes* (Strep pyogenes) is a common cause of skin infections.

•

REVIEW OF LITERATURE

In canned fruits the sugar content of fruit and sirup is about equal, as cooking during processing makes the tissues permeable to the sirup and the sugar therefore penetrates readily and uniformly. However, Goodbrod (9), Perry and Cruess (20) report that in the freezing of fresh fruits one of the problems encountered is that of uneven distribution of the sugar between the fruit and the sirup.

Guadagni (11) reported that very slight variations in fruit-to-sugar ratio may influence judges who are sensitive to differences in sweetness. When it is considered that biological material is not uniform and that individuals differ from each other and are inconsistent with themselves from time to time, it is conceivable that there would, due to these variations, be considerable fluctuation. Therefore, objective measurements are greatly desired and needed. Lawler (17) also indicated that objective tests for frozen food quality are needed.

Robinson, Lee, Slate and Pederson (21) reported that their strawberries averaged 6.98 percent soluble solids for 311 varieties tested in 1945. Eighty-seven percent of the values fell between 5.1 and 8.0 percent. The average for 1946 at the same location in the state of New York was 8.84 percent, which was not a significant difference. These varieties were tested by using a fruit to sugar ratio of four to one.

Sistrunk and Cain (22) studied some of the factors affecting the suitability of berries for processing. Their data were based upon many experimental and commercial varieties grown at the Oregon

1. The first step in the process of identifying a problem is to recognize that a problem exists. This is often done by comparing current performance with a desired state or goal.
2. Once a problem is identified, the next step is to define the problem more precisely. This involves determining the scope of the problem and the specific areas that are affected.
3. The third step is to analyze the causes of the problem. This is done by identifying the factors that contribute to the problem and determining their relative importance.
4. The fourth step is to develop a plan of action. This involves identifying the specific steps that need to be taken to solve the problem and determining the resources that will be required.
5. The fifth step is to implement the plan. This involves putting the plan into action and monitoring the progress of the solution.
6. The sixth step is to evaluate the results. This involves comparing the actual results with the desired results and determining whether the problem has been solved.
7. The seventh step is to take corrective action. This involves identifying the reasons for any problems that occurred during the implementation process and taking steps to prevent them from happening again.
8. The eighth step is to document the process. This involves recording the steps that were taken to solve the problem and the results that were achieved.
9. The ninth step is to communicate the results. This involves sharing the results of the problem-solving process with the relevant stakeholders.
10. The tenth step is to review the process. This involves reflecting on the entire process and identifying areas for improvement.

Agricultural Experiment Station farm, Corvallis. They found that variety, maturity and weather conditions appear to be the main factors involved in the differences in their objective data. The soluble solids and total solids of strawberries and red raspberries were slightly lower in 1958 than in 1957. This was believed to be due largely to the rainy weather during the harvesting period. Near the end of the season, however, the total and soluble solids values increased as drier weather prevailed.

The range of values for fresh strawberries for 1958 were from 6.2 to 11.6, with an average of 8.4 percent soluble solids on 22 samples. These gave an average of 26.3 percent soluble solids after packing with four parts of fruit to one part of dry sugar. The range of values for fresh red raspberries for 1958 were from 6.5 to 13.0, with an average of 8.8 percent soluble solids on 27 samples. These gave an average of 20.5 percent soluble solids after packing with 40° Brix sirup. Ten ounces of berries were used to five ounces of sirup.

Talbert, Leinbach, Brekke and McHenry (24) analyzed commercial samples of frozen strawberries for total acidity, total sugar, total solids, and soluble solids. It was thought that one or more of these analyses would provide a reliable index for determining constancy of the ratio of fruit to packing medium for the various types of equipment.

The analytical data, particularly total solids and degrees Brix obtained in these experiments, were stated to be good indexes of constancy of the ratio of fruit to packing medium. Since the fruit and packing medium have not come to equilibrium in composition at

time of filling, variations in ratio of fruit to medium during filling of successive containers will cause corresponding changes in total solids, degrees Brix, and sugar and acid contents of the product.

Data from these analyses of commercial samples showed significant differences in regard to constancy of ratio of fruit to sweetener or packing medium. It was found that there were gross variations in the composition, particularly in sugar content, between various samples regardless of the type of equipment used. These ranged from 16.0° to 24.7° Brix and 21.1° to 32.3° Brix for the sirup- and dry-sugar packs, respectively. Variations in composition of raw material and processing variables together were given as the likely explanation for the variability in composition.

Fallscheer and Osborn (5) reported that, in work on frozen strawberries and red raspberries, some difficulty was encountered in obtaining satisfactory collaborative results for drained weights.

Factors Affecting Drained Weights

Packing Media. Joslyn and Marsh (16) reported that weight losses in general varied with the kind and character of fruit. They were greatest in water and least in sirups of certain concentrations. The loss in weight, as a result of the freezing and thawing, did not vary in a regular manner with the concentration of sirup, as would be expected. There was no definite relation between loss in weight and concentration of sirup as would be the case if osmotic action alone had been responsible for the loss in weight.

The average loss in weight increased with increase in concentration of the sirup, being greater in 60° and in 40° Balling sirup than in 25° sirup. They believed that the loss in weight that occurs upon thawing is due not only to water extracted by the osmotic action of the sugar or sirup but also to loss of juice that exudes as a result of injury to the tissues on freezing.

The loss in weight of apricots decreased with increase in the ratio of fruit to added cane sugar, but the results for Banner strawberries were rather variable. The substitution of cerelese for cane sugar increased the loss in weight to some extent. The substitution of invert sugar testing 76.3° Balling decreased the loss in weight. However, in these tests there was no direct relation between the ratio of fruit to sugar and the loss in weight.

The data reported by Wiegant (27) indicate that in some instances the loss in weight of berries frozen with sugar increased as the ratio of fruit to sugar decreased, and in others there was no continuous and regular increase.

Perry and Cruess (20) showed that strawberries, packed four parts of berries to one part of sugar and frozen, lost much more weight than those packed in 40° Brix sirup and, in the dry sugar pack, the sugar penetration was not much greater.

Joslyn (15) stated that it is clearly evident that the loss in weight after freezing is less in the 40° Brix sirup pack than in the sugar pack, and that this loss increases with an increase in sugar concentration or with an increase in the ratio of sugar to fruit.

- Wiederholungsfragen
 - Welche Aufgaben hat die Zelle?
 - Produktion (z.B. Proteine, Lipide, Kohlenhydrate)
 - Abfallbeseitigung (z.B. Abfallstoffe, Abfallprodukte)
 - Abwehr (z.B. Abwehrstoffe, Abwehrzellen)
 - Abfallbeseitigung (z.B. Abfallstoffe, Abfallprodukte)
 - Abwehr (z.B. Abwehrstoffe, Abwehrzellen)
 - Welche Aufgaben hat die Zelle?
 - Produktion (z.B. Proteine, Lipide, Kohlenhydrate)
 - Abfallbeseitigung (z.B. Abfallstoffe, Abfallprodukte)
 - Abwehr (z.B. Abwehrstoffe, Abwehrzellen)
 - Abfallbeseitigung (z.B. Abfallstoffe, Abfallprodukte)
 - Abwehr (z.B. Abwehrstoffe, Abwehrzellen)
- Wiederholungsfragen
 - Welche Aufgaben hat die Zelle?
 - Produktion (z.B. Proteine, Lipide, Kohlenhydrate)
 - Abfallbeseitigung (z.B. Abfallstoffe, Abfallprodukte)
 - Abwehr (z.B. Abwehrstoffe, Abwehrzellen)
 - Abfallbeseitigung (z.B. Abfallstoffe, Abfallprodukte)
 - Abwehr (z.B. Abwehrstoffe, Abwehrzellen)
 - Welche Aufgaben hat die Zelle?
 - Produktion (z.B. Proteine, Lipide, Kohlenhydrate)
 - Abfallbeseitigung (z.B. Abfallstoffe, Abfallprodukte)
 - Abwehr (z.B. Abwehrstoffe, Abwehrzellen)
 - Abfallbeseitigung (z.B. Abfallstoffe, Abfallprodukte)
 - Abwehr (z.B. Abwehrstoffe, Abwehrzellen)

Bedford (3) reported higher drained weights on strawberries and red raspberries with the use of sirups.

Aref, Sidwell and Litwiller (1), Bockian and Aref (4) found that whole strawberries frozen in ten pound friction-top cans were more influenced by the ratio than by the kind of sweetener added to the fruit prior to freezing. The nine to one ratio resulted in the highest drained weights, and the four to one ratio resulted in the lowest. They thawed the frozen whole berries at about 72° F. exactly 24 hours. Then the berries were drained for three minutes on an eight-mesh wire screen, which was eighteen inches in diameter. Both the drained berries and the drip were weighed separately, their combined weights considered as the total weight, and the percentage drained weight calculated.

Delay of Freezing. Joslyn and Marsh (16) made a calculation of the amount of sugar absorbed by strawberries. It showed that preliminary storage at 32° F. before freezing practically doubled the absorption of sugar by the berries. Owing to losses due to absorption by the container and evaporation in storage, which can be corrected for only approximately, the absorption of sugar calculated by a "sugar balance" did not agree exactly with that calculated by a "water balance."

There was more variation in sugar absorbed than in water withdrawn. The water withdrawn increased somewhat, but not markedly and not regularly, with increases in concentration of sugar or sirup. The loss in weight found was not equal to that calculated from the

difference between water withdrawn and sugar absorbed, although it was of the same order of magnitude. They postulated that this may be due to certain inaccuracies in results, such as failing to correct completely for evaporation and carton absorption losses, or to errors in the postulated mechanisms. They thought that the latter was probably the case.

Perry and Cruess (20) stated that delay of freezing can have a definite effect on the drained weight.

Wiegand and Wilder (28) showed that delaying the freezing of packages does not result in higher or lower drained weights but does effect their variability. The drained weights varied less when packages were delayed after processing before freezing than when frozen immediately. Variation in the drained weight of identical packages was much larger than the variation of the sirup cut-out.

Wiegand and Wilder (29) found that there is very little effect on the drained weight by delaying packages for one-half, one and two hours before freezing. It was discovered that the drained weights from the packages that were not put into the freezer immediately after packing varied less from package to package than those frozen immediately. In other words, when the packed fruits were held back from going into the freezer immediately, it tended to even out the differences or variations between package drained weights.

Storage Temperature. Joslyn and Marsh (16) indicated that the osmotic action of the sirup plays an important role in the extraction of water from the fruit when stored at room temperature. Fruits

packed in water or dilute sirup generally gain weight while those packed in concentrated sirups lose weight.

Guadagni, Nimmo and Jansen (10) indicated that even though marked changes in solids distribution occurred in the thawed samples, no significant drained weight changes could be demonstrated during storage of frozen strawberries at temperatures of 0° to 30° F.

Guadagni, Nimmo and Jansen (12) determined drained weights by thawing the samples at room temperature in the draft of an electric fan for two hours, and then draining the samples on a screen of eight-mesh wire for two minutes.

The samples of red raspberries were packed into twelve ounce composite cartons in the ratio of three parts berries to one part of 50 percent sucrose sirup. After packing, the samples were frozen in air-blast freezers at 0° to -20° F.

The drained weight of the raspberries gradually decreased during storage at 20° F. to the extent of approximately 10 percent. At lower temperatures, no consistent trends of decreasing drained weights were observed. At higher temperatures the magnitude of the changes was approximately the same, but they occurred much more rapidly.

Guadagni and Nimmo (13) pointed out that, with retail packages of frozen strawberries and red raspberries, no significant differences could be demonstrated in the drained weights of samples held at the fluctuating cycles and mean steady temperatures. This might be due to the extensive variations in fruit-to-liquid packing media; but since there was little or no difference in drained weights during

1. The first step in the process of the scientific method is to make an observation or ask a question. For example, a scientist might observe that a plant grows better in one type of soil than another.

2. Next, the scientist forms a hypothesis, which is a prediction or an educated guess about the outcome of an experiment. For example, the scientist might hypothesize that the plant will grow taller in soil A than in soil B.

3. The third step is to design an experiment to test the hypothesis. This involves setting up a controlled experiment where only one variable is changed at a time. In this case, the scientist would plant the same type of plant in two different soils and measure their growth.

4. After conducting the experiment, the scientist collects data and analyzes the results. If the plant in soil A grew taller than the plant in soil B, the hypothesis is supported.

5. Finally, the scientist draws a conclusion based on the results of the experiment. If the hypothesis is supported, the scientist might conclude that soil A is better for growing this type of plant.

The scientific method is a systematic approach to investigating a question or solving a problem. It involves making observations, forming hypotheses, designing experiments, collecting data, and drawing conclusions. This process helps scientists to understand the natural world and to develop new technologies.

One of the key features of the scientific method is that it is self-correcting. If a hypothesis is not supported by the results of an experiment, the scientist can revise the hypothesis and try again. This process allows scientists to refine their understanding of the world over time.

The scientific method is used in a wide range of fields, from biology and chemistry to physics and social sciences. It is a fundamental part of the scientific process and is essential for making progress in our understanding of the world.

In conclusion, the scientific method is a powerful tool for investigating the natural world. It provides a systematic approach to solving problems and making discoveries. By following the steps of the scientific method, scientists can ensure that their findings are based on evidence and are reliable.

storage at temperatures of 0° to 30° F., it is unlikely that fluctuation significantly affects this measurement.

Thawing Method. Woodruff (31) reported that the loss of juice from a frozen fruit on thawing is not due to the rupturing of the cell wall, but it is due to the denaturation of the protein within the cell. This has not been substantiated by recent studies.

Joslyn and Marsh (16) reported that a decrease in the weight of frozen fruit occurs during and after thawing. They believe this decrease is due to water separating as ice during freezing and not re-absorbed during thawing, to leakage of fluids through tissues injured by freezing, and to osmotic action of the sugar or sirup. It does not depend entirely upon tissue disorganization, since it is offset in part by absorption of sugar in the case of sugar and sirup-pack fruits, but it depends to a large extent upon the handling of the product during thawing and draining. It is difficult to remove all of the added and exuded juice, sirup, or water from the product by draining after thawing, although data so obtained are comparable.

In general, the losses reported varied with the kind and character of fruit. They were greatest in water and least in sirups of certain concentrations. The loss in weight, as a result of the freezing and thawing, did not vary in a regular manner with the concentration of sirup, as would be expected. There was no definite relation between loss in weight and concentration of sirup as would be the case if osmotic action alone had been responsible for the loss in weight. These results are similar to those reported by Wiegand (27) for berries.

Fallscheer and Osborn (5) stated that drained weights of frozen fruits show promise as a rapid means of calculating fruit content.

Fallscheer (6) recommended that drained weights be used as a rapid sorting method for estimating the proportion of fruit in frozen fruit packs. However, he recommended that the method be used as stated by Osborn and Hatmaker (19). The packages should be allowed to thaw in their original containers, without disturbing the contents before draining. This was found more reliable than the method by Fallscheer and Osborn (5) in which the frozen sample was removed from its container and placed in a pliable bag of convenient size.

The three above authors and Hirzel (14) felt that, if drained weights are to be used for standards, a standard thawing method should be adopted. They recommended that the samples be thawed in a 68-70° F. water bath until the center of the sample reaches this temperature. The water should be agitated while the samples are being defrosted.

Factors Affecting Soluble Solids

Packing Media. Joslyn (15) reports that a 50° Brix sirup was the minimum concentration necessary for color retention in strawberries.

According to Fieger, Dubois and Kalgereas (8), a better frozen strawberry pack was produced by the addition of sugar to Klondike strawberries instead of sirup. The use of sirup resulted in floating of the berries and less uniform absorption of the sugar solution. Whole berries absorbed less sugar than slices. The panel rated

sliced fruit highest when a four to one or five to one fruit-sugar ratio was used.

Bartlett and Hard (2) stated that red raspberries packed in corn sirup were judged equal to the control in portions of replacement sirup up to 75 percent.

Strohmaier and Pen (23) indicated that the best general method of preparing frozen strawberries for evaluating varieties thus far tested was slicing and mixing with dry sugar in a four or five to one ratio. A 40° Brix pack was made to get an actual ratio of fruit to sugar of five to one, having the fruit covered with sirup and a net weight of one pound. Their California varieties of strawberries tested from 7.4 to 10.3 percent soluble solids.

Fallscheer and Osborn (5) indicated that, when the packing medium is dry sugar, a soluble solids reading on the refractometer will give a rapid and quite accurate means of calculating the fruit content. After the fruit to packing medium ratio for sirup-packed fruit has been calculated, the soluble solids figure gives a convenient means of calculating sirup strength.

Osborn and Hatmaker (19) made a study of samples collected over a period of years from the areas of production in the United States and came up with a national average of 8.0 percent soluble solids for fresh strawberries and 10.5 percent for red raspberries.

Delay of Freezing. Joslyn and Marsh (16) made a calculation of the amount of sugar absorbed by strawberries. It showed that preliminary storage at 32° F. before freezing practically doubled the

absorption of sugar by the berries. Owing to losses due to absorption by the container and evaporation in storage, which can be corrected for only approximately, the absorption of sugar calculated by a "sugar balance" did not agree exactly with that calculated by a "water balance."

There was more variation in sugar absorbed than in water withdrawn. The water withdrawn increased somewhat, but not markedly and not regularly, with increases in concentration of sugar or sirup.

Fieger, Dubois and Kalgereas (8) reported that Klondike strawberries were found to absorb more sugar when frozen immediately than they did after a one-hour holding period prior to freezing. Any delay in freezing after the addition of dry sugar resulted in poorer quality when compared to the quality of strawberries that were frozen immediately.

Storage Temperature. Wiegand and Wilder (28) indicated that there is generally no significant difference in the cut-out values between four and twelve weeks storage at 0° F. of frozen fruits. The data from their investigation pointed out that some combinations of in-going fruit and sirup result in a higher drained weight. It was noticed that the sirup cut-out is influenced less than the drained weight by differences in fruit. However, a given sirup cut-out was not a reliable index of in-going fruit weight.

Guadagni, Nimmo and Jansen (10) made a study of retail packages of frozen strawberries and found that the ratio of soluble solids between drained fruit and sirup indicated no significant change during

storage at temperatures of 10° F. or lower. When the temperature was raised to 20° F. there was a slight increase in solids ratio until an apparent equilibrium value was reached. At 25° F., a very gradual increase in solids ratio occurred, denoting a steady increase in soluble solids of the fruit and decrease in the sirup. Of major interest, however, was the rapid approach to the equilibrium value of 1.0 when the berries were stored at 30° F. At this temperature, equilibrium was attained within eight days, and it was clear that thawing temperatures were necessary for the soluble solids of the fruit to become equal to that of the sirup. A ratio of four parts of fruit to one part of dry sugar was used in these samples.

Guadagni, Nimmo and Jansen (12) made a study of retail packages of frozen red raspberries and found that soluble solids of samples held at 20° F., or lower, change very little with storage time. At 25° F., however, the solids content of the raspberries gradually increased while the sirup solids gradually decreased; hence, the soluble solids ratio increases very slowly. When the samples were stored at 30° F., an equilibrium value of 1.0 was obtained in a matter of one to two weeks. A soluble solids ratio of 1.0 is obtained only under complete thawing conditions, and therefore serves as an excellent thaw index.

Thawing Method. Perry and Cruess (20) reported that sliced strawberries of a well-known brand, when thawed on a screen, gave 32.5 percent soluble solids in the sirup and 16.6 percent in the fruit after rinsing and drying with a towel. Sugar penetration had not been very

marked. When thawed in the package and allowed to stand one hour, the sirup showed 30.7 percent soluble solids and the fruit 17.4 percent. At two hours the values were 29.8 and 21.3 percent; at five hours, 29.6 and 22.0 percent; and at 22 hours, 29.8 and 23.9 percent, respectively. The berries had been packed with dry sugar.

Strawberries of the same lot were sliced, covered with sirup, and frozen at once as a check sample. After storage and thawing the sirup was 34.7 percent soluble solids and the fruit 14.0 percent; only 0.5 percent above their natural soluble solids content.

Denaturation of the cell's protein is believed to be the cause of juice loss from a frozen fruit during the thawing process, according to Woodruff (31). This has not been substantiated by recent studies.

Proposed Federal Standards

The Federal Register (7) reported a notice of a proposal to be made part of the Federal Food, Drug, and Cosmetic Act. Part of this proposal had to do with definitions, standards of identity, and fill of container. These, in part, stated that if a frozen fruit in household-size containers has more than five parts or less than four parts by weight of fruit ingredient to one part by weight of dry packing medium, it is reasonable and in the interest of consumers to specify that the name of such frozen fruit include the proportions of fruit ingredient and dry packing medium.

The general industry practice now is to use dry sugar as the packing medium for sliced strawberries. It is reasonable, and in the

interest of consumers, that if a liquid packing medium is used with sliced strawberries, the density of such liquid packing medium not be less than 60° Brix.

It also stated that a reasonable maximum weight of put-in liquid packing medium for sliced strawberries be 25 percent of the combined weight of fruit ingredient and liquid packing medium. A figure of 30 percent was given for red raspberries. A reasonable minimum weight of put-in liquid packing medium for a frozen fruit was given as 15 percent of the combined weight of fruit ingredient and liquid packing medium.

• Wiederholungsfragen sind Fragen, die in der Vorlesung bereits gestellt wurden und die Sie sich selbst beantworten können. Diese Fragen sind in der Regel mit einem Sternchen (*) gekennzeichnet.

• Wiederholungsfragen sind Fragen, die in der Vorlesung bereits gestellt wurden und die Sie sich selbst beantworten können. Diese Fragen sind in der Regel mit einem Sternchen (*) gekennzeichnet.

• Wiederholungsfragen sind Fragen, die in der Vorlesung bereits gestellt wurden und die Sie sich selbst beantworten können. Diese Fragen sind in der Regel mit einem Sternchen (*) gekennzeichnet.

• Wiederholungsfragen sind Fragen, die in der Vorlesung bereits gestellt wurden und die Sie sich selbst beantworten können. Diese Fragen sind in der Regel mit einem Sternchen (*) gekennzeichnet.

• Wiederholungsfragen sind Fragen, die in der Vorlesung bereits gestellt wurden und die Sie sich selbst beantworten können. Diese Fragen sind in der Regel mit einem Sternchen (*) gekennzeichnet.

MATERIALS AND METHODS

Raw Material

Strawberries. The Premier variety of strawberry was picked on June 6, 1955, and transported from Keeler, Michigan, to Michigan State University. The berries were placed in a 34° F. room overnight and processed the next morning.

The Northwest variety of strawberry was picked on June 22, 1956, near Corvallis, Oregon. The berries were placed in a 33° F. room overnight at Oregon State College and processed the next morning.

Raspberries. The Taylor variety of red raspberry was picked on July 29, 1954, and transported from Kewadin (Traverse City area), Michigan, to Michigan State University. The berries were placed in a 34° F. room overnight and processed the next morning.

The Willamette variety of red raspberry was picked on July 6, 1956, and transported from Stayton, Oregon, to Oregon State College. The berries were placed in a 33° F. room overnight and processed the next morning.

Sample Processing

The Michigan berries were processed in the Food Technology pilot plant of the Department of Horticulture at Michigan State University. The berries in Oregon were processed in the pilot plant of the Department of Food Technology at Oregon State College.

One hallock was selected at random from each flat in the 34° F. room, and the berries from about fifteen hallocks were blended in a

1. The first step in the process of creating a new product is to identify a market need. This involves conducting market research to understand what consumers want and what problems they are trying to solve.

2. Once a market need is identified, the next step is to develop a concept. This involves brainstorming ideas and creating a rough sketch of the product.

3. The third step is to create a prototype. This is a physical model of the product that can be used to test the design and make improvements.

4. After the prototype is created, the next step is to conduct a feasibility study. This involves evaluating the product's potential for success in the market, considering factors such as cost, production, and distribution.

5. Once the feasibility study is complete, the next step is to develop a business plan. This document outlines the company's goals, strategies, and financial projections.

6. The final step in the process is to launch the product. This involves marketing the product to the target audience and distributing it to retailers or customers.

7. After the product is launched, the company should continue to monitor its performance and make improvements as needed. This may involve conducting additional market research, testing new features, or adjusting the marketing strategy.

8. The process of creating a new product is an iterative one, and it often takes multiple cycles of development and testing before a product is ready for launch.

9. It is important to have a clear understanding of the target market and to be willing to listen to feedback from customers and stakeholders throughout the process.

10. Finally, it is important to have a strong financial foundation in place before launching a new product, as this will help to ensure that the company has the resources needed to succeed.

sink of water. After gently washing and removing blemished and immature berries, they were placed in stainless steel draining pans.

The strawberries were sliced in a mechanical slicer which had revolving blades three-eighths of an inch apart. The sliced strawberries and whole raspberries were then packaged by using different size containers and different amounts and strengths of packing media. The controls had no packing medium; the other samples had dry sugar, water, or sirup as packing media. The amounts of dry sugar and sirup used approximately represent the minimum and maximum levels as given in the Federal Register (7).

The dry sugar packs had 17 percent dry sugar (a ratio of five parts of berries to one part of dry sugar by weight) in one series and 20 percent dry sugar (a ratio of four parts of berries to one part of dry sugar by weight) in the other series.

In one series the water and sirup packs of sliced strawberries had 17 percent packing medium, based on the combined weight of berries and packing medium. The other series had 25 percent packing medium. Red raspberries had 17 percent and 29 percent packing medium, respectively.

Three types of sirups were used for each product. The 50° Brix sirup contained 50 parts sucrose and 50 parts water by weight. The 60° Brix sirup contained 60 parts sucrose and 40 parts water by weight. The third sirup used was labeled corn sirup. It was prepared by replacing 25 percent of the sucrose solids with corn sirup (Puritose #40). The exact strengths of the sirups used as packing media are shown in the respective data tables.

Strawberries in Michigan and raspberries in Oregon were packaged in 211 X 400 (No. 1 picnic) and 307 X 409 (No. 2) "F" enameled cans. Marathon pint heat sealing bags in Marathon pint cartons (about 400 X 310 X 200) were also used. These containers contained seven and one-half, fifteen, and twelve ounces of berries, respectively.

Strawberries in Oregon and raspberries in Michigan were packaged only in the 211 X 400 "F" enameled cans and the Marathon heat sealing bags in Marathon pint cartons.

The packs using liquid packing medium were packaged by weighing into the container the berries and the liquid and sealing the containers. The dry sugar packs were packaged by weighing the berries and dry sugar into separate containers and then pouring them both at the same time into a third container. In Oregon the sliced strawberry dry sugar pack was prepared by mixing the correct weighed amount of berries and sugar into a pan. After standing for about ten minutes, they were filled into the containers and sealed.

The containers in Michigan were frozen in a plate-freezer at -20° F. and placed in 0° F. storage, while in Oregon the samples were frozen in an air-blast freezer at -15° F. and placed in 0° F. storage. The samples were held at 0° F. storage for five to six months with the exception of the Michigan frozen sliced strawberries; these were held five to six weeks. However, this should not influence the comparative results (10) (12) (13) (28).

A sufficient number of samples were packed of each series to give six replicates, plus two extras for "test runs", leakers, errors, etc.

This amounted to approximately one thousand containers of frozen sliced strawberries and red raspberries.

Sample Analysis

Thawing Methods. A rectangular tank, measuring two feet by two feet by two feet, and equipped with a steam heating coil, was used for the water thawing procedure. The containers were placed on a one-inch mesh wire screen six inches below the top of the tank and were totally submerged in water during the period of thawing. They were separated by a series of crosswires, so there was at least one inch of free water circulating about each container. The water was agitated by a propeller-type stirrer with a rated speed of 1725 R.P.M. The water temperature was maintained at 68° F.

Cabinets built for the ripening of peaches were used to thaw the series of air-thaw samples in Michigan. Circulating among the containers placed in the cabinets was a draft of 68° F. air. The containers were spaced so that there was adequate air movement among the samples.

Containers were thawed until the center of each container was approximately 68° F. The length of thawing time was determined by making a few "test runs." Periodically, the actual sample was checked to determine if the desired center temperature was being obtained.

Frozen sliced strawberries at 0° F. with seven and one-half, twelve and fifteen ounces of berries were thawed in moving 68° F. water for two and one-half, two and three-fourths, and three and one-half hours, respectively; and in moving 68° F. air for eight and one-half,

nine, and twelve hours, respectively. Frozen red raspberries at 0° F. with seven and one-half and twelve ounces of berries were thawed in moving 68° F. water for two and two and one-half hours, respectively; and in moving 68° F. air for seven and one-half, and eight hours, respectively.

A series of strawberries in Michigan were given additional thaw-time. The time for these strawberries was extended for two and four additional hours.

Drained Weight Determination. A package containing thawed berries was emptied evenly on a circular screen of eight-mesh wire. The liquid was caught in a pan. After draining exactly two minutes the drained berries were weighed to the nearest one-eighth (0.13) of an ounce. This weight, less the weight of the screen, was recorded as the drained weight for that particular sample. When observing the calculated percentage drained weight (in-going berry weight basis), it would be well to remember that each 0.13 of an ounce of seven and one-half, twelve, and fifteen ounces of berries represents a difference of 1.7, 1.1, and 0.9 percent, respectively.

Soluble Solids Determination. The percent soluble solids was determined by an Abbe refractometer. This determination was made on three parts of each sample: (1) the drained liquid, (2) the liquid obtained after blending the drained berries in a Waring blender for two minutes, and (3) the mixture which resulted from an additional two minutes blending of the Waring blender of the drained liquid and the blended drained berries.

Statistical Analyses.

Standard deviation (SD) and least significance difference (LSD) were determined. The designs and methods of Li (18) furnished helpful guidance.

RESULTS AND DISCUSSION

It is a well-known fact that the variety of the product, the degree of maturity, the cultural influences, the weather conditions, and the processing, freezing, and thawing procedures are extremely important factors involved in obtaining any data on biological material. Nevertheless, the data so obtained are comparable and can indicate trends. It must be remembered in viewing the results of this study that these data are based upon only one common commercial variety of strawberry and one common commercial variety of red raspberry from each of the two states represented, namely Michigan and Oregon. It must also be remembered that these data represent means for only one year in each state.

The results of this experiment are presented in the form of tables. Each datum in these tables represents the average of six replicate samples. The tables are designed to aid in the interpretation of the data with respect to effects of certain packing factors on frozen sliced strawberries and frozen red raspberries used in this experiment. Tables have been organized for each of the products studied to show drained weights of the thawed berries and to show the soluble solids of the thawed product, the thawed drained berries, and the thawed drained liquid. These results are expressed in terms most commonly found in the literature, such as drained weights being reported in ounces and percentages, calculated by comparing the drained weight to the in-going berry weight and to the net weight, and soluble solids being reported as percentage.

Changes in the drained weights and the soluble solids occur during and after thawing of frozen products. These changes are due to leakage of juice through tissues injured by freezing and/or mechanical injury and to the diffusion action of the packing medium. Selective permeability is destroyed by the killing action of freezing temperatures, and the tissues become osmotically indifferent so that a loss or gain of soluble solids as well as water occurs during and after thawing. Mechanical injury, such as the slicing of strawberries, will also affect diffusion.

Additional data were obtained in Michigan with respect to the effect of thawing frozen sliced strawberries and red raspberries by various methods. One series was thawed by means of moving water and another by means of moving air. Still another series of frozen sliced strawberries was thawed by an extended thaw-time in moving water. The data compiled as a result of these studies are found in their respective tables.

Effect of Strength and Amount of Packing Media

The purpose of this series is to show the effect of strength and amount of packing media upon the drained weights and the soluble solids of thawed sliced strawberries and red raspberries.

Drained Weights. The author has noticed that in many published articles the method of percentage determination is not stated clearly. Hence, this paragraph of explanation is felt to be necessary in order to insure clear understanding of the data. The drained weights found

in the tables which pertain to this phase of the experiment (Tables 1, 2, 3, and 4) are not only expressed as ounces but also as percentage of net weight and as percentage of in-going berry weight.

The frozen sliced strawberries and red raspberries packed without any packing medium, both in Michigan and Oregon, had average drained weight ratios of approximately 67 percent and 77 percent, respectively. From these figures it can be noted that the drained weights for the sliced strawberries was approximately 10 percent less than that of the red raspberries.

The sliced strawberries and red raspberries packed in sirup and dry sugar media gave significantly higher drained weights than those packed in a water medium.

There was no significant difference between the 50° Brix packs and the 60° Brix packs for either the sliced strawberries or the red raspberries.

The dry sugar (100° Brix) packs were not as consistent and ranged from similar to lower drained weights than those packed in a water medium. Notations made at the actual determination time indicated that in many instances undissolved sugar remained on the drained berries. This fact may be partially responsible for the variation; therefore, the data from this particular experiment are not conclusive. However, other work done by the author on frozen sliced strawberries has shown that the change in drained weight is primarily due to the loss of juice from the berries.

TABLE 1.
EFFECT OF STRENGTH AND AMOUNT OF PACKING MEDIA ON THE DRAINED WEIGHT OF SLICED STRAWBERRIES

Michigan						Oregon					
Packing Medium			Drained Weight			Packing Medium			Drained Weight		
O Brix	% ^a	Oz.	% ^b	% ^c	Headspace in 16th in.	O Brix	%	Oz.	% ^b	% ^c	Headspace in 16th in.
Put-in Weight 7.5 oz.						Put-in Weight 15 oz.					
-	0	5.13 ^d	e	68.4	21.3	-	0	5.21 ^d	69.5	69.5	21.0
0	17	5.27	.09	70.3	12.5	0	17	5.65	.22	75.3	11.0
	25	5.13	.18	68.4	7.0		25	5.69	.21	75.9	6.0
50.2	17	5.67	.20	75.6	12.5	50.7	17	5.61	.14	74.8	14.5
	25	5.94	.13	79.2	8.8		25	5.79	.10	77.2	11.0
60.0	17	5.94	.10	79.2	13.3	60.7	17	5.73	.27	76.4	15.0
	25	5.73	.09	76.4	10.0		25	5.88	.25	78.4	10.0
100	17	5.38	.20	71.7	15.5	100	17	5.92	.15	78.9	16.0
	20	5.11	.18	68.7	14.4		20	5.96	.22	79.5	14.0
Average	Low	5.57		74.3	61.9			5.73		76.4	63.7
Values	High	5.48		73.1	55.0			5.83		77.7	59.3
No significant difference between packing treatments. No significant difference between packing treatments.						No significant difference between packing treatments.					
Put-in Weight 7.5 oz.						Put-in Weight 15 oz.					
-	0	9.57	.23	63.8	20.0	-	0	10.19	.63	67.9	20.3
0	17	9.38	.38	62.5	9.3	0	17	10.63	.08	70.9	10.7
	25	9.15	.23	61.0	4.0		25	10.67	.15	71.1	4.0
50.2	17	10.69	.43	71.3	11.0	50.7	17	11.00	.31	73.4	12.0
	25	9.82	.23	65.4	6.2		25	11.23	.29	74.9	7.0
60.0	17	10.11	.21	67.4	12.0	60.7	17	10.90	.31	72.7	13.0
	25	10.09	.44	67.3	9.1		25	11.38	.22	75.9	7.5
100	17	10.19	.21	67.9	14.0	100	17	11.67	.15	77.8	14.0
	20	9.86	.16	65.7	11.7		20	11.65	.37	77.7	13.3
Average	Low	10.09		67.3	53.6			11.05		73.7	61.4
Values	High	9.73		64.9	49.5			11.23		74.9	57.2
LSD between	5%		.18			LSD between	5%		.15		
packing treatments	1%		.24			packing treatment	5%		.15		
(a) Percent of total weight. (b) Percent of in-going berry weight. (c) Percent on total net weight basis.						(a) Percent of total weight. (b) Percent of in-going berry weight. (c) Percent on total net weight basis.					
(e) Each datum represents the average of six replicates. (e) Standard deviation.						(e) Each datum represents the average of six replicates. (e) Standard deviation.					

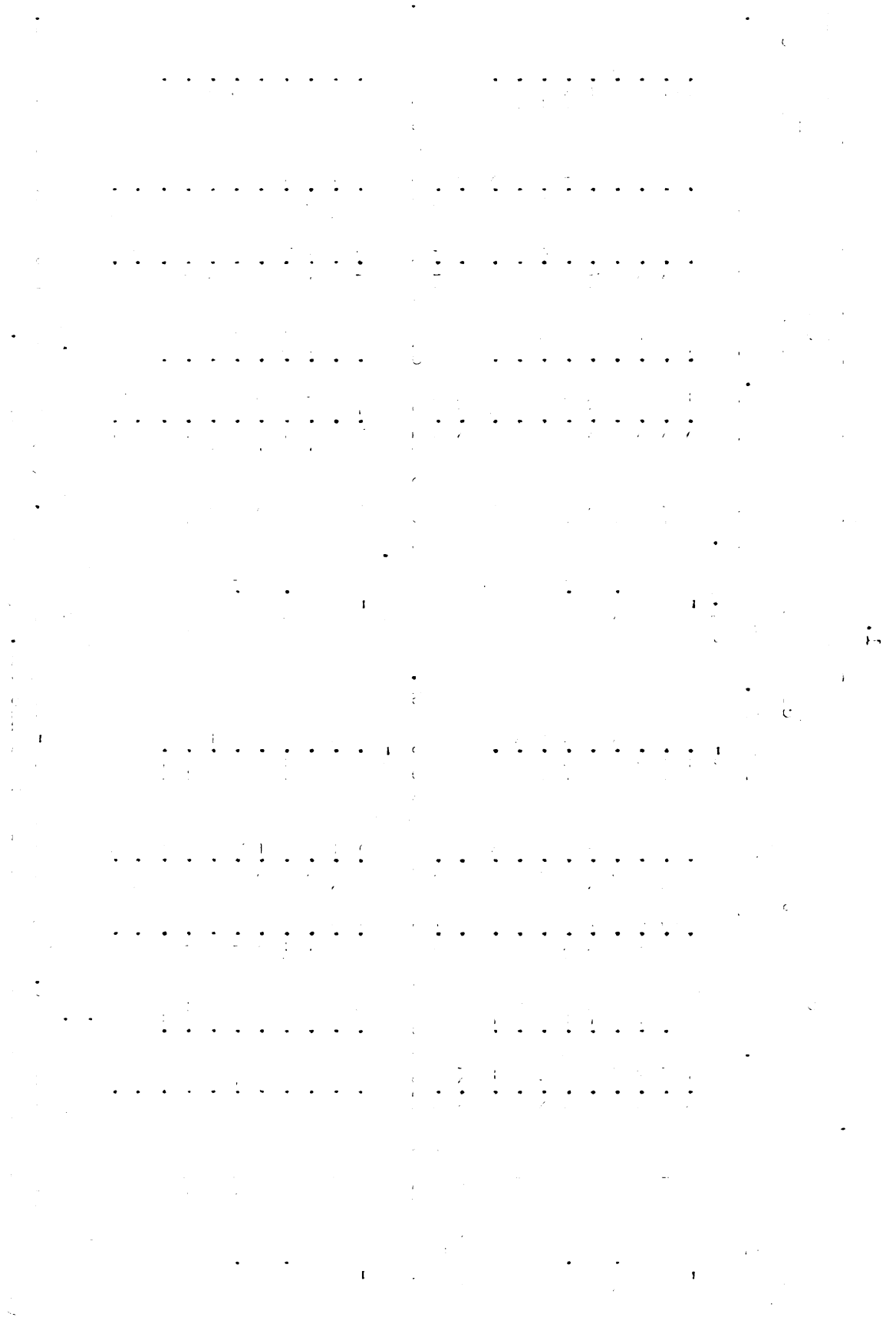


Table 2.
EFFECT OF STRENGTH AND AMOUNT OF PACKING MEDIA
ON THE DRAINED WEIGHT OF SLICED STRAWBERRIES
PACKED WITH 12 OUNCES OF BERRIES

Packing Medium		Drained Weight			
° Brix	% ^a	Oz.		% ^b	% ^c
Michigan					
-	0	8.27 ^d	.31 ^e	68.9	68.9
0	17	8.44	.25	70.3	58.7
	25	7.38	.25	61.5	46.1
50.2	17	8.42	.20	70.2	58.6
	25	8.40	.24	70.0	52.5
60.0	17	9.04	.19	75.2	62.9
	25	7.96	.19	66.3	49.8
100	17	8.44	.20	70.3	58.2
	20	8.50	.26	70.9	56.7
Average	Low	8.59		71.6	59.6
Values	High	8.06		67.2	51.3

LSD between packing treatments: 5% .13; 1% .18

- (a) Percent of total net weight.
- (b) Percent calculated on in-going berry weight basis.
- (c) Percent calculated on net weight basis.
- (d) Each datum represents the average of six replicates.
- (e) Standard deviation.

• $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (probability of getting two heads)
 • $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (probability of getting two tails)
 • $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (probability of getting one head and one tail)
 • $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (probability of getting one tail and one head)

Outcome	Probability
HH	$\frac{1}{4}$
HT	$\frac{1}{4}$
TH	$\frac{1}{4}$
TT	$\frac{1}{4}$

• The probability of getting two heads is $\frac{1}{4}$
 • The probability of getting two tails is $\frac{1}{4}$
 • The probability of getting one head and one tail is $\frac{1}{2}$
 • The probability of getting one tail and one head is $\frac{1}{2}$

Table 3.
EFFECT OF STRENGTH AND AMOUNT OF PACKING MEDIA ON THE DRAINED WEIGHT OF RED RASPBERRIES

Michigan					Oregon								
Packing Medium		Headspace		Packing Medium O Brix %	Drained Weight		Headspace		Packing Medium O Brix %	Drained Weight		Headspace	
O Brix %	%	Oz.	%		Oz.	%	in 16th in.	%		Oz.	%	in 16th in.	%
Put-in Weight 7.5 oz.													
-	0	5.75 ^d	.08 ^e	76.6	76.7	23.3	0	5.77 ^d	.09 ^e	76.9	76.9	21.3	
0	17	6.09	.11	80.0	67.3	14.0	17	5.94	.10	79.2	66.0	13.0	
50.4	29	6.37	.05	84.8	60.6	6.3	29	6.38	.16	85.1	60.8	5.3	
	17	6.26	.05	83.6	69.7	-	17	6.40	.20	85.3	71.1	14.5	
60.4	29	6.84	.10	91.2	65.1	-	29	6.69	.17	89.2	63.7	8.5	
	17	6.46	.10	86.1	71.8	16.0	17	6.48	.21	86.4	72.0	15.0	
100	29	7.00	.08	93.3	66.7	9.2	29	6.63	.14	88.4	63.1	9.3	
	17	6.48	.09	86.4	72.0	16.0	17	6.69	.22	89.2	74.3	16.0	
	20	6.69	.10	89.2	71.3	15.5	20	6.75	.45	90.0	72.0	16.0	
Average	Low	6.32		84.3	70.2			6.38		85.1	70.9		
Values	High	6.72		89.6	65.9			6.61		88.1	64.9		
LSD between packing treatments: 5% .05; 1% .07													
LSD between packing treatments: 5% .21													
Put-in Weight 12 oz.													
-	0	9.36	.12	78.0	78.0	-	0	9.32	.17	77.7	77.7	-	
0	17	9.78	.12	81.5	67.4	-	17	9.69	.13	80.8	66.8	-	
50.4	29	9.98	.14	83.2	58.7	-	29	9.94	.17	82.8	58.5	-	
	17	9.73	.37	81.8	67.1	-	17	10.27	.14	85.6	70.8	-	
60.4	29	10.34	.07	86.2	60.8	-	29	10.65	.17	88.8	62.6	-	
	17	10.15	.14	84.6	70.0	-	17	10.40	.23	86.7	71.7	-	
100	29	10.53	.12	87.8	61.9	-	29	10.69	.13	89.1	62.9	-	
	17	9.96	.22	83.0	68.7	-	17	10.42	.54	86.8	71.9	-	
	20	10.07	.31	83.9	67.1	-	20	10.77	.36	89.8	71.8	-	
Average	Low	9.91		82.6	68.3			10.20		85.0	70.3		
Values	High	10.23		85.3	62.1			10.51		87.6	64.0		
LSD between packing treatments: 5% .12; 1% .17													
LSD between packing treatments: 5% .13; 1% .18													

(a) Percent of total net weight. (b) Percent of in-going berry weight.
(c) Percent on total net weight basis. (d) Each datum represents average of six replicates.
(e) Standard deviation.

(a) Percent of total net weight. (b) Percent of in-going berry weight.

(c) Percent on total net weight basis. (d) Each datum represents average of six replicates.

(e) Standard deviation.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Table 4.
EFFECT OF STRENGTH AND AMOUNT OF PACKING MEDIA
ON THE DRAINED WEIGHT OF RED RASPBERRIES
PACKED WITH 15 OUNCES OF BERRIES

Packing Medium		Drained Weight			Headspace in 16th in.	
° Brix	% ^a	Oz.	% ^b	% ^c		
<u>Oregon</u>						
-	0	11.13 ^d	.19 ^e	74.2	74.2	21.3
0	17	12.04	.28	80.3	66.9	10.7
	29	11.94	.15	79.6	56.9	2.7
51.1	17	12.25	.14	81.7	68.1	12.3
	29	12.79	.26	85.3	60.9	5.5
60.8	17	12.59	.45	83.9	69.9	13.0
	29	13.06	.22	87.1	62.2	5.3
100	17	12.34	.90	82.3	68.6	20.0
	20	12.77	.30	85.1	68.1	14.9
Average	Low	12.31		82.1	68.4	
Values	High	12.64		84.3	62.0	

LSD between packing treatments: 5% .16; 1% .22

- (a) Percent of total net weight.
- (b) Percent calculated on in-going berry weight basis.
- (c) Percent calculated on net weight basis.
- (d) Each datum represents the average of six replicates.
- (e) Standard deviation.

With the exception of Michigan strawberries, the highest drained weights were obtained when the maximum amounts of packing medium were used when calculated as percentage of in-going berry weight. However, when expressed as percentage of total net weight, lower values were obtained for the maximum amounts of packing medium than for the minimum amounts of packing medium; for the strawberries 13 and 17 percent less, respectively, and for raspberries 14 and 23 percent less, respectively, for the minimum and maximum amounts of packing medium.

These data indicate the definite importance of knowing how percentage drained weights are calculated before comparing them with other percentages reported in the literature, whether on net weight basis or on in-going berry weight basis.

In the statistical analyses, the strawberry data proved to be rather inconsistent. In the smallest containers (7.5 ounces) the amount of packing medium had no significant effect on the drained weight. The two larger containers (12 ounces and 15 ounces) showed a significant difference at the 5 percent and 1 percent levels and indicated that the maximum amount of packing media gave the highest drained weights with the exception of Michigan strawberries. This exception was probably due to variation in the fresh fruit.

The red raspberry data was consistent in all cases and indicated that the larger amounts of packing media gave higher drained weights at the 5 percent and 1 percent levels.

Soluble Solids. The fresh strawberries used in Michigan for this experiment averaged 6.9 percent soluble solids, and those used

in Oregon averaged 10.5 percent. The soluble solids content of the fresh red raspberries averaged 10.5 and 9.2 percent for Michigan and Oregon, respectively. The national average soluble solids values given for strawberries and red raspberries are 8.0 and 10.5 percent, respectively (19).

The soluble solids of a mixture depends upon the soluble solids of the berries and the sugar or sirup which is added. The effect of the initial soluble solids content is reflected in the final soluble solids reading (Tables 5 and 6). It can also be seen that the soluble solids content of the blended mixture is not significantly different from that calculated from the in-going value, which indicates that the method used for determining these values is quite reliable.

By using a sugar balance method as in Tables 7, 8, 9, and 10, an indication was given of the sugar absorption by the berries. Comparing this data to that of the liquid we arrive at an estimate of the possible error involved by comparing the two methods of calculation. This figure appears on the tables as the root-mean-square of discrepancies and is used as the measure of the difference between two methods. The results indicate that the methods used are reliable.

The soluble solids of both the drained fruit and liquid reflect the amount of sugar added and the ratio of fruit to the packing medium. Using the sugar balance method (Tables 7, 8, 9, and 10) it can be seen that in the lots packed without packing media and the lots packed with water a loss of soluble solids occurs. In the sirup packs, there is a slight absorption of sugar, while in the dry sugar packs there is

Table 5.
EFFECT OF STRENGTH AND AMOUNT OF PACKING MEDIA
AND OF SIZE OF CONTAINER ON THE SOLUBLE SOLIDS OF BLENDED SLICED STRAWBERRIES

Packing Medium ° Brix	7.5 oz. berries			12 oz. berries			15 oz. berries		
	Determined	Calculated ^b		Determined	Calculated ^b		Determined	Calculated ^b	
	S.S.	S.S.	%	S.S.	S.S.	%	S.S.	S.S.	%
	%	%		%	%		%	%	
<u>Michigan</u>									
-	0	6.4 ^c	.12 ^d	-	6.3 ^c	.38 ^d	-	6.9 ^c	.10 ^d
0	17	5.3	.17	5.0	.24		5.3	.23	5.8
	25	4.8	.18	4.4	.16		4.7	.24	5.2
50.2	17	14.8	.68	14.3	.19		13.6	.20	14.1
	25	17.3	.26	18.1	.08		17.3	.33	17.7
60	17	14.7	.54	16.0	.26		15.3	.35	15.8
	25	20.6	.90	21.0	.29		19.7	.34	20.2
100	17	22.0	.68	23.0	.77		22.5	.18	22.4
	20	23.9	1.54	25.1	.64		25.0	.59	25.5

Table 5--continued.

Packing Medium ° Brix	Medium %	7.5 oz. berries			12 oz. berries			15 oz. berries		
		Determined		Calculated ^b	Determined		Calculated ^b	Determined		Calculated ^b
		S.S. %	S.S. %	S.S. %	S.S. %	S.S. %	S.S. %	S.S. %	S.S. %	
Oregon										
-	0	10.6	.55	-	-	-	-	10.5	.33	-
0	17	8.6	.36	8.8	-	-	-	8.7	.08	8.8
	25	7.2	.23	8.0	--	--	-	7.3	.21	7.9
50.7	17	17.5	.27	17.3	-	-	-	17.6	.20	17.2
	25	21.2	.44	20.6	-	-	-	20.9	.11	20.6
60.7	17	19.5	.50	19.0	-	-	-	19.1	.21	18.9
	25	22.5	1.82	23.1	-	-	-	23.0	.25	23.0
100	17	24.7	.84	25.5	-	-	-	24.5	.39	25.4
	20	26.2	1.15	28.5	-	-	-	28.0	1.45	28.4
Average	Low	15.9		15.9				16.0		16.1
Values	High	18.0		18.4				18.6		18.6

(a) Percent of total net weight.

(b) Weight of sugar added plus weight of sugar in berries divided by total weight.

(c) Each datum represents the average of six replicates.

(d) Standard deviation.

1 1 1 1 1

• 1
• 1
• 1

1 1 1 1 1

• 1
• 1
• 1

• • • •

• 1
• 1
• 1

• • • •

• 1
• 1
• 1

• • • •

• 1
• 1
• 1

• • • •

• 1
• 1
• 1

• • • •

• 1
• 1
• 1

• • • •

• 1
• 1
• 1

• • • •

• 1
• 1
• 1

• • • •

Table 6.
EFFECT OF STRENGTH AND AMOUNT OF PACKING MEDIA
AND OF SIZE OF CONTAINER ON SOLUBLE SOLIDS OF BLENDED RED RASPBERRIES

Packing Medium ° Brix	7.5 oz. berries			12 oz. berries			15 oz. berries		
	Determined S.S. %	Calculated ^b S.S. %	Michigan	Determined S.S. %	Calculated ^b S.S. %	Determined S.S. %	Calculated ^b S.S. %		
-	0	10.5 ^c	.26 ^d	-	10.5 ^c	.35 ^d	-	-	-
0	17	8.7	.43	8.8	.24	8.7	-	-	-
	29	7.9	.11	7.5	.05	7.4	-	-	-
50.4	17	18.0	.04	17.2	.42	17.4	-	-	-
	29	23.1	.37	21.9	.79	22.2	-	-	-
60.4	17	19.5	.22	18.8	.74	19.1	-	-	-
	29	25.4	.38	24.8	.21	25.2	-	-	-
100	17	24.5	.50	25.4	.43	25.9	-	-	-
	20	27.3	.68	28.4	.26	28.4	-	-	-

Table 6--continued.

Packing Medium ° Brix		7.5 oz. berries				12 oz. berries				15 oz. berries			
		Determined		Calculated ^b		Determined		Calculated ^b		Determined		Calculated ^b	
		S.S.	%	S.S.	%	S.S.	%	S.S.	%	S.S.	%	S.S.	%
-	0	8.8	.66	-	-	9.2	.39	-	-	8.8 ^c	.57 ^d	-	-
0	17	6.9	.33	7.3		7.2	.34	7.6		7.5	.30	7.3	
	29	6.1	.20	6.3		6.0	.14	6.5		5.8	.30	6.3	
51.1	17	16.3	.23	15.9		17.1	.22	16.4		16.2	.22	15.9	
	29	21.7	.34	20.9		22.0	.17	21.5		21.3	.12	20.9	
60.8	17	18.2	.33	17.5		18.8	.49	18.1		18.1	.31	17.5	
	29	23.9	.58	23.7		25.1	.18	24.4		24.3	.41	23.7	
100	17	23.6	.46	24.0		24.7	.26	24.9		24.5	.77	24.0	
	20	25.1	3.44	27.1		26.9	.37	27.4		27.1	.57	27.0	
Average	Low	17.0		16.9		17.5		17.3		16.6		16.2	
Values	High	20.1		20.1		20.4		20.4		19.6		19.5	

(a) Percent of total net weight.

(b) Weight of sugar added plus weight of sugar in berries divided by total weight.

(c) Each datum represents the average of six replicates.

(d) Standard deviation.

Table 7.
EFFECT OF STRENGTH AND MINIMUM AMOUNT OF PACKING MEDIA
ON THE SOLUBLE SOLIDS OF DRAINED SLICED STRAWBERRIES
AND LIQUID AND SUGAR ABSORPTION

Packing Medium ° Brix	Soluble Solids				Sugar loss or gain			
	Fruit	Liquid			Fruit	Liquid	Fruit	Liquid
	%	%			oz.	oz.	g ^a	g ^a
<u>Michigan</u>								
<u>Put-in Weight 7.5 ounces berries</u>								
-	6.2 ^b	.15 ^c	6.0 ^b	.05 ^c	-.16	.14	-2.2	1.9
0	5.4	.21	4.9	.09	-.20	.20	-2.6	2.7
50.2	10.1	.43	20.6	1.18	.09	-.07	1.2	-0.9
60.0	9.6	.45	22.3	.86	.09	-.22	1.2	-2.9
100	16.8	.45	29.3	1.59	.42	-.44	5.7	-5.9
<u>Put-in Weight 12 ounces berries</u>								
-	6.2	.59	6.0	.20	-.24	.22	-2.0	1.9
0	5.6	.27	4.3	.12	-.28	.26	-2.4	2.1
50.2	10.1	.53	19.3	.87	.09	-.06	.08	-.05
60.0	10.2	.20	24.7	.50	.17	-.12	1.4	-1.0
100	17.0	1.48	29.3	1.17	.68	-.72	5.7	-6.0
<u>Put-in Weight 15 ounces berries</u>								
-	6.8	.31	6.3	.32	-.38	.34	-2.6	2.3
0	6.0	.00	4.7	.15	-.47	.41	-3.2	2.7
50.2	11.1	.50	17.9	.70	.15	-.20	1.0	-1.3
60.0	11.4	.44	21.4	.72	.12	-.11	0.8	-0.8
100	16.4	.66	29.2	.74	.64	-.72	4.2	-4.8
<u>Oregon</u>								
<u>Put-in Weight 7.5 ounces berries</u>								
-	12.5	.50	9.5	.50	-.14	.22	-1.9	2.9
0	9.8	.42	6.4	.39	-.24	.21	-3.2	2.9
50.7	14.2	.23	21.3	.33	0	-.04	0	-0.5
60.7	15.6	.40	24.9	.82	.10	-.10	1.3	-1.3
100	20.2	.68	31.9	.54	.40	-.52	5.4	-6.9
<u>Put-in Weight 15 ounces berries</u>								
-	10.8	.23	9.7	.18	-.47	.47	-3.2	3.1
0	9.8	.16	7.0	.16	-.53	.52	-3.6	3.4
50.7	15.1	.27	21.7	1.51	.09	.0	0.6	.0
60.7	16.0	.26	22.9	.77	.17	-.20	1.1	-1.3
100	20.9	.61	30.2	.95	.86	-1.09	5.8	-7.3

Root-mean-square of discrepancies .07 ounces

- (a) Percent calculated on fresh weight basis.
- (b) Each datum represents the average of six replicates.
- (c) Standard deviation.

Table 8.
EFFECT OF STRENGTH AND MAXIMUM AMOUNT OF PACKING MEDIA
ON THE SOLUBLE SOLIDS OF DRAINED SLICED STRAWBERRIES
AND LIQUID AND SUGAR ABSORPTION

Packing Medium ° Brix	Soluble Solids				Sugar loss or gain			
	Fruit %	Liquid %		Fruit oz.	Liquid oz.	Fruit % ^a	Liquid % ^a	
Michigan								
Put-in Weight 7.5 ounces berries								
-	6.2 ^b	.15 ^c	6.0 ^b	.05 ^c	-.16	.14	-2.2	1.9
0	5.3	.24	4.0	.12	-.21	.29	-2.8	3.4
50.2	10.1	.08	26.8	.71	.12	-.17	1.6	-2.2
60	10.5	.61	31.2	.74	.12	-.17	1.6	-2.2
100	17.6	1.09	31.1	1.96	.42	-.55	5.6	-7.3
Put-in Weight 12 ounces berries								
-	6.2	.59	6.0	.20	-.24	.22	-2.0	1.9
0	5.0	.04	4.0	.05	-.39	.35	-3.2	2.9
50.2	10.9	.41	22.9	1.14	.16	-.27	1.3	-2.2
60	11.0	.34	27.2	.99	.12	-.21	1.0	-1.8
100	17.1	1.42	33.8	1.07	.70	-.80	5.8	-6.7
Put-in Weight 15 ounces berries								
-	6.8	.31	6.3	.32	-.38	.34	-2.6	2.3
0	5.4	.21	4.2	.10	-.54	.46	-3.6	3.0
50.2	11.8	.31	22.6	.70	.12	-.21	0.8	-1.4
60.0	13.3	.31	26.8	1.28	.31	-.34	2.1	-2.3
100	18.6	1.34	32.9	1.01	.80	-.83	5.3	-5.5
Oregon								
Put-in Weight 7.5 ounces berries								
-	12.5	.50	9.5	.50	-.14	.22	-1.9	2.9
0	8.4	.21	5.4	.36	-.30	.23	-4.0	3.1
50.7	16.1	.43	27.0	.24	.14	-.13	1.8	-1.8
60.7	18.2	.19	30.2	.67	.28	-.27	3.7	-3.7
100	20.6	1.03	34.9	1.07	.43	-.68	5.8	-9.1
Put-in Weight 15 ounces berries								
-	10.8	.23	9.7	.18	-.47	.47	-3.2	3.1
0	8.2	.29	6.1	.11	-.70	.57	-4.7	3.8
50.7	16.6	.34	25.5	.46	.29	-.30	1.9	-2.0
60.7	17.6	.42	29.5	.63	.43	-.49	2.9	-3.3
100	22.5	.94	36.0	1.81	1.05	-1.19	7.0	-8.0

Root-mean-square of discrepancies .09 ounces

- (a) Percent calculated on fresh weight basis.
- (b) Each datum represents the average of six replicates.
- (c) Standard deviation.

Table 9.
EFFECT OF STRENGTH AND MINIMUM AMOUNT OF PACKING MEDIA
ON THE SOLUBLE SOLIDS OF DRAINED RED RASPBERRIES
AND LIQUID AND SUGAR ABSORPTION

Packing Medium ° Brix	Soluble Solids				Sugar loss or gain			
	Fruit %	Liquid %		Fruit oz.	Liquid oz.	Fruit % ^a	Liquid % ^a	
Michigan								
	Put-in Weight 7.5 ounces berries							
-	11.0 ^b	.04 ^c	9.5 ^b	.32 ^c	-.16	.17	-2.1	2.2
0	10.2	.08	7.2	.43	-.17	.22	-2.3	2.9
50.4	14.5	.28	24.2	.66	.12	-.10	1.6	-1.3
60.4	15.7	.42	27.5	.49	.23	-.21	3.0	-2.8
100	19.0	.63	41.0	1.42	.44	-.47	5.9	-6.2
	Put-in Weight 12 ounces berries							
-	11.1	.15	8.8	.20	-.22	.23	-1.8	1.9
0	10.1	.10	5.4	.12	-.27	.26	-2.3	2.1
50.4	14.2	.04	25.0	1.21	.12	-.07	1.0	-0.6
60.4	15.1	.28	29.1	.97	.27	-.24	2.3	-2.0
100	17.3	.92	42.4	.70	.46	-.58	3.9	-4.8
Oregon								
	Put-in Weight 7.5 ounces berries							
-	8.9	.70	7.2	.46	-.15	.13	-2.0	1.7
0	8.4	.35	3.9	.20	-.16	.12	-2.2	1.6
51.1	12.0	.30	26.3	.84	.11	-.08	1.4	-1.1
60.8	12.3	.37	31.1	.83	.14	-.13	1.8	-1.7
100	16.7	.63	42.6	2.21	.46	-.52	6.1	-6.9
	Put-in Weight 12 ounces berries							
-	9.4	.40	7.7	.36	-.23	.21	-1.9	1.7
0	8.4	.24	4.4	.31	-.29	.21	-2.4	1.8
51.1	12.5	.38	26.1	.57	.18	-.17	1.5	-1.5
60.8	13.2	.22	30.9	1.36	.27	-.25	2.2	-2.1
100	17.4	.47	41.5	2.77	.71	-.81	5.9	-6.7
	Put-in Weight 15 ounces berries							
-	9.1	.59	7.5	.49	-.31	.29	-2.1	1.9
0	8.8	.28	4.8	.28	-.26	.29	-1.7	1.9
51.1	12.0	.29	23.7	.67	.15	-.17	1.0	-1.1
60.8	12.8	.59	29.3	1.40	.29	-.24	2.0	-1.6
100	16.6	.98	41.8	1.94	.73	-.63	4.9	-4.2

Root-mean-square of discrepancies .05 ounces

- (a) Percent calculated on fresh weight basis.
- (b) Each datum represents the average of six replicates.
- (c) Standard deviation.

Figure 1 consists of four scatter plots arranged in a 2x2 grid. The top-left plot shows the relationship between the number of children in the household (Y-axis) and the number of children in the household (X-axis). The top-right plot shows the relationship between the number of children in the household (Y-axis) and the number of children in the household (X-axis). The bottom-left plot shows the relationship between the number of children in the household (Y-axis) and the number of children in the household (X-axis). The bottom-right plot shows the relationship between the number of children in the household (Y-axis) and the number of children in the household (X-axis). All plots show a positive correlation between the number of children and the number of children in the household.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	52
--	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----

[illegible][illegible][illegible]

Table 10.
EFFECT OF STRENGTH AND MAXIMUM AMOUNT OF PACKING MEDIA
ON THE SOLUBLE SOLIDS OF DRAINED RED RASPBERRIES
AND LIQUID AND SUGAR ABSORPTION

Packing Medium ° Brix	Soluble Solids				Sugar loss or gain			
	Fruit		Liquid		Fruit	Liquid	Fruit	Liquid
	%		%		oz.	oz.	% ^a	% ^a
Michigan								
Put-in Weight 7.5 ounces berries								
-	11.0 ^b	.04 ^c	9.5 ^b	.32 ^c	-.16	.17	-2.1	2.2
0	9.5	.34	5.6	.34	-.18	.23	-2.5	3.1
50.4	18.0	.59	30.9	.33	.44	-.38	5.9	-5.1
60.4	19.0	.59	37.6	.78	.54	-.47	7.2	-6.6
100	20.5	.62	46.7	2.58	.58	-.62	7.8	-8.3
Put-in Weight 12 ounces berries								
-	11.1	.15	8.8	.20	-.22	.23	-1.8	1.9
0	9.5	.23	4.3	.30	-.31	.30	-2.6	2.5
50.4	16.1	.20	32.0	2.52	.41	-.39	3.4	-3.2
60.4	17.6	.55	38.5	.70	.59	-.53	4.9	-4.4
100	18.9	1.37	43.9	3.66	.64	-.84	5.4	-7.0
Oregon								
Put-in Weight 7.5 ounces berries								
-	8.9	.70	7.2	.46	-.15	.13	-2.0	1.7
0	8.2	.26	3.1	.08	-.14	.13	-1.8	1.7
51.1	13.9	1.86	34.6	.47	.27	-.22	3.6	-2.9
60.8	13.7	.62	39.1	1.05	.25	-.31	3.3	-4.2
100	19.3	1.13	46.9	1.68	.64	-.65	8.6	-8.6
Put-in Weight 12 ounces berries								
-	9.4	.40	7.7	.36	-.23	.21	-1.9	1.7
0	7.9	.12	3.7	.26	-.32	.26	-2.7	2.2
51.1	14.0	.18	33.9	.32	.39	-.40	3.2	-3.4
60.8	15.1	.31	40.3	.86	.51	-.50	4.3	-4.1
100	19.7	1.66	43.6	2.27	1.02	-1.16	8.5	-9.6
Put-in Weight 15 ounces berries								
-	9.1	.59	7.5	.49	-.31	.29	-2.1	1.9
0	7.4	.40	3.8	.28	-.44	.34	-2.9	2.3
51.1	13.7	.25	32.4	.55	.43	-.41	2.9	-2.7
60.8	14.7	.44	38.6	1.17	.60	-.58	4.0	-3.9
100	17.9	1.08	45.3	1.32	.97	-1.04	6.4	-6.9

Root-mean-square of discrepancies .06 ounces

- (a) Percent calculated on fresh weight basis.
(b) Each datum represents the average of six replicates.
(c) Standard deviation.

considerably more. However, this may not be a true absorption. In many cases during the actual determination of the dry sugar packs, it was noted that undissolved sugar remained on the surface of the drained berries. Therefore, on the basis of these results, it is presumptuous to state that there is any direct relationship between true sugar absorption and drained weight.

Dixon's sign test was used on the data for sliced strawberries (Table 11). Chi-square was found to be equal to 6.25, which is greater than 3.84, the 5 percent point of Chi-square distribution with one degree of freedom. The conclusion is that Oregon strawberries, with the higher soluble solids content, absorbed significantly more sugar than the Michigan strawberries.

Dixon's sign test was also used on the red raspberry data (Table 12). In this instance the Chi-square value was found to be equal to 2.25, which is less than 3.84, the 5 percent point of Chi-square distribution with one degree of freedom. Therefore, the absorption difference between the Michigan and Oregon red raspberries is not significant.

Effect of Size of Container.

The purpose of this series is to indicate the effect the size of container has upon the drained weights and the soluble solids of these particular thawed sliced strawberries and red raspberries. Both of the products were packed into different size containers before being processed.

- **Einfluss von Temperatur und Feuchtigkeit:**
 - Hohe Temperaturen und Feuchtigkeit fördern die Vermehrung von Bakterien und Pilzen.
 - Niedrige Temperaturen verlangsamen das Wachstum, können aber auch zu Frostschäden führen.
- **Einfluss von Licht und Sauerstoff:**
 - Licht kann die Photosynthese von Algen fördern.
 - Sauerstoff ist für viele Mikroorganismen notwendig.
- **Einfluss von Nährstoffen:**
 - Nährstoffe wie Stickstoff und Phosphor sind für das Wachstum von Mikroorganismen wichtig.
 - Übermäßige Nährstoffe können zu Eutrophierung führen.
- **Einfluss von pH-Wert:**
 - Der pH-Wert beeinflusst die Aktivität von Enzymen und die Stabilität von Zellstrukturen.
 - Extreme pH-Werte können das Leben von Mikroorganismen einschränken.
- **Einfluss von Salzgehalt:**
 - Hoher Salzgehalt kann die Osmotik von Zellen beeinträchtigen.
 - Einige Mikroorganismen sind halophil (salzliebend).
- **Einfluss von Druck:**
 - Hoher Druck kann die Zellstruktur zerstören.
 - Einige Mikroorganismen sind barophil (druckliebend).
- **Einfluss von Strahlung:**
 - UV-Strahlung kann die DNA schädigen.
 - Ionisierende Strahlung kann Zellen abtöten.
- **Einfluss von mechanischer Belastung:**
 - Stöße und Scherkräfte können Zellen beschädigen.
 - Einige Mikroorganismen sind mechanisch resistent.
- **Einfluss von chemischen Substanzen:**
 - Giftstoffe und Antibiotika können das Wachstum von Mikroorganismen hemmen.
 - Einige Mikroorganismen sind resistent gegen Chemikalien.
- **Einfluss von anderen Organismen:**
 - Konkurrenz um Ressourcen.
 - Symbiose und Mutualismus.
 - Predation durch Protozoen.

Table 11.
SUGAR ABSORPTION OF SLICED STRAWBERRIES

Packing Medium ° Brix	Berries oz.	Packing Medium %	Sugar Gain		Sign
			Michigan oz.	Oregon oz.	
50	7.5	17	0.093	0.002	+
		25	0.120	0.137	-
	15.0	17	0.152	0.086	+
		25	0.124	0.289	-
60	7.5	17	0.090	0.099	-
		25	0.122	0.275	-
	15.0	17	0.118	0.169	-
		25	0.307	0.428	-
60 (corn sirup)	7.5	17	0.090	0.093	-
		25	0.095	0.259	-
	15.0	17	0.098	0.105	-
		25	0.284	0.435	-
100	7.5	17	0.424	0.401	+
		20	0.419	0.433	-
	15.0	17	0.636	0.864	-
		20	0.799	1.046	-
Average Values		Low	0.213	0.227	
		High	0.284	0.413	

By Dixon's sign test, Chi-square equals 6.25 with 1 d.f.

Table 12.
SUGAR ABSORPTION OF RED RASPBERRIES

Packing Medium ° Brix	Berries oz.	Packing Medium %	Sugar Gain		Sign
			Michigan oz.	Oregon oz.	
50	7.5	17	0.121	0.108	+
		29	0.443	0.270	+
	12.0	17	0.122	0.180	-
		29	0.405	0.387	+
60	7.5	17	0.226	0.137	+
		29	0.542	0.248	+
	12.0	17	0.273	0.269	+
		29	0.593	0.510	+
61 (corn sirup)	7.5	17	0.220	0.117	+
		29	0.534	0.323	+
	12.0	17	0.254	0.218	+
		29	0.607	0.456	+
100	7.5	17	0.443	0.457	-
		20	0.583	0.643	-
	12.0	17	0.463	0.709	-
		20	0.643	1.018	-
Average Values	Low		0.265	0.274	
	High		0.544	0.482	

By Dixon's sign test, Chi-square equals 2.25 with 1 d.f.

Drained Weight. Drained weight cannot be expressed as ounces when a comparison is to be made between the drained weight of berries packed in different size containers. Therefore, in this experiment, drained weights are expressed as percentage based on net weight and on in-going berry weight (Tables 1, 2, 3, and 4).

The drained weights for sliced strawberries which were packed in both Michigan and Oregon in different size containers without any packing medium were approximately 10 percent less than that of red raspberries. The drained weights were approximately 67 percent and 77 percent for sliced strawberries and red raspberries, respectively.

The drained weight ratios decreased as the size of the container increased (Tables 1, 2, 3, and 4). The large containers probably gave lower drained weights because of the greater weight of the berries and the resulting crushing effect and/or the longer thaw-time that was necessary for the center of the container to reach the temperature of the defrosting medium (68° F.). The berries and the packing medium to the exterior of the container were thawed and remained at 68° F. while the heat penetrated the remainder of the container. This, of course, was a longer period of time than was necessary for the smaller sized containers.

Soluble Solids. The soluble solids of a mixture depends upon the soluble solids of the berries and the sugar or sirup which is added. The effect of the initial soluble solids content is reflected in the final soluble solids content of the pack (Tables 5 and 6). It can also be seen that the soluble solids content of the blended

mixture is not significantly different from that calculated from the in-going value, which indicates that the method used for determining these values is quite reliable.

The soluble solids of the thawed products indicate the fluctuations which could be expected due to differences in container sizes (Tables 7, 8, 9, and 10). In general, the larger containers gave slightly higher soluble solids in the thawed product. This was also true for the drained berries, but the opposite was true for the drained liquid. The trend was much more generally noticed in analyzing the sliced strawberries, which was probably due to the fact that their cut flesh surfaces are more sensitive to water and sugar diffusion.

Greater fluctuation in data can be expected with the smaller containers. In a smaller amount, as in the 7.5 ounce container, one berry or slice of berry added to the pack or one berry or slice of berry withheld from the pack has a greater influence on the end result.

Effect of Partial Replacement of Sugar Sirup with Corn Sirup

The purpose of this series is to determine what effect partial replacement of sugar sirup with corn sirup would have upon the drained weights and soluble solids of the thawed sliced strawberries and red raspberries. The berries were packaged in the usual manner except for the sirup packing medium. A 60 percent sirup was used in which 25 percent of the sucrose solids were replaced by corn sirup solids. This type of packing medium has become quite common in

commercial packs.

Drained Weights. The sliced strawberry data indicated no significant difference in the drained weights of either the Michigan or the Oregon packs between the sucrose sirup pack and the sucrose corn sirup pack.(Table 13). The red raspberry data showed similar results (Table 14).

Soluble Solids. There were no significant differences in the average means of the soluble solids of the sliced strawberry and red raspberry samples used in this series (Tables 15 and 16). Therefore, the data in this particular series are comparable.

There were no significant differences in the average soluble solids of the thawed drained sliced strawberries or red raspberries and drained liquid between the sucrose sirup pack and the sucrose corn sirup pack (Tables 17 and 18).

Effect of Thawing by Means of Moving Water and Moving Air

The primary influencing factor when thawing by different media is the rate of heat exchange between the container and the surrounding medium. Water is a much better heat conductor than air. This is again proven in this experiment because of the much longer length of time required for air thawing than for water thawing.

Drained Weights. The drained weights of the water-thawed sliced strawberries were significantly higher than those thawed by moving air (Table 19). There was no significant difference in the drained weights of the red raspberries between thawing treatments (Table 20).

- **Einfluss von Temperatur und Feuchtigkeit:**
 - Die **Temperatur** beeinflusst die **Reaktionsgeschwindigkeit** der **Enzyme**, die für die **Proteinbiosynthese** verantwortlich sind. Hohe Temperaturen können zu einer **Denaturierung** der Enzyme führen, was die **Proteinproduktion** beeinträchtigt.
 - Die **Feuchtigkeit** ist entscheidend für die **Hydratation** der **Proteine** und die **Stabilität** der **Zellen**. Ein Mangel an Feuchtigkeit kann zu einer **Dehydrierung** der Zellen führen, was die **Proteinbiosynthese** hemmt.
- **Einfluss von Nährstoffen:**
 - Die **Verfügbarkeit von Aminosäuren** ist ein Schlüsselfaktor für die **Proteinbiosynthese**. Ein Mangel an bestimmten Aminosäuren kann die **Proteinproduktion** begrenzen.
 - Die **Verfügbarkeit von Vitaminen und Mineralien** beeinflusst die **Enzymaktivität** und die **Stabilität** der **Proteine**.
- **Einfluss von Stressfaktoren:**
 - **Stressfaktoren** wie **UV-Strahlung**, **Salzstress** oder **Wundstress** können die **Proteinbiosynthese** beeinträchtigen. Sie können zu einer **Denaturierung** der **Proteine** oder zu einer **Reduktion** der **Enzymaktivität** führen.
 - Die **Produktion von Stressproteinen** ist eine **Abwehrreaktion** der Zelle auf Stressfaktoren. Diese **Proteine** helfen der Zelle, den Stress zu bewältigen und die **Proteinbiosynthese** zu stabilisieren.
- **Einfluss von Hormonen:**
 - **Hormone** wie **Wachstumsfaktoren** oder **Stresshormone** können die **Proteinbiosynthese** regulieren. Sie können die **Enzymaktivität** erhöhen oder die **Produktion** von **Stressproteinen** induzieren.
 - Die **Produktion von Hormonen** ist eine **Regulation** der **Proteinbiosynthese**, die die **Zellteilung** und die **Proteinproduktion** steuert.
- **Einfluss von Pathogenen:**
 - **Pathogene** wie **Bakterien** oder **Viren** können die **Proteinbiosynthese** beeinträchtigen. Sie können die **Enzymaktivität** reduzieren oder die **Produktion** von **Stressproteinen** induzieren.
 - Die **Produktion von Antikörpern** ist eine **Abwehrreaktion** der Zelle auf Pathogene. Diese **Antikörper** helfen der Zelle, die **Proteinbiosynthese** zu stabilisieren.
- **Einfluss von Umweltfaktoren:**
 - **Umweltfaktoren** wie **Luftverschmutzung** oder **Wasserstress** können die **Proteinbiosynthese** beeinträchtigen. Sie können die **Enzymaktivität** reduzieren oder die **Produktion** von **Stressproteinen** induzieren.
 - Die **Produktion von Stressproteinen** ist eine **Abwehrreaktion** der Zelle auf Umweltfaktoren. Diese **Proteine** helfen der Zelle, den Stress zu bewältigen und die **Proteinbiosynthese** zu stabilisieren.
- **Einfluss von Genen:**
 - Die **Genexpression** ist ein Schlüsselfaktor für die **Proteinbiosynthese**. Die **Produktion** von **Enzymen** und **Proteinen** ist durch die **Genexpression** reguliert.
 - Die **Produktion von Genen** ist eine **Regulation** der **Proteinbiosynthese**, die die **Zellteilung** und die **Proteinproduktion** steuert.
- **Einfluss von Signalwegen:**
 - **Signalwege** wie **Wachstumsfaktoren** oder **Stresshormone** können die **Proteinbiosynthese** regulieren. Sie können die **Enzymaktivität** erhöhen oder die **Produktion** von **Stressproteinen** induzieren.
 - Die **Produktion von Signalwegen** ist eine **Regulation** der **Proteinbiosynthese**, die die **Zellteilung** und die **Proteinproduktion** steuert.

Table 13.
EFFECT OF PARTIAL REPLACEMENT OF SUGAR SIRUP WITH CORN SIRUP
ON THE DRAINED WEIGHTS OF SLICED STRAWBERRIES

Packing Medium		Berries oz.	Sugar Sirup ^b Drained Weight		Corn Sirup ^{cd} Drained Weight	
% ^a	oz.		oz.		oz.	
<u>Michigan</u>						
17	1.5	7.5	5.94 ^e	.10 ^f	5.63 ^e	.14 ^f
25	2.5	7.5	5.73	.09	5.42	.10
17	2.4	12.0	9.04	.19	8.71	.25
25	4.0	12.0	7.96	.19	8.19	.29
17	3.0	15.0	10.11	.21	9.77	.31
25	5.0	15.0	10.09	.44	9.92	.27
Average			8.15		7.94	
<u>Oregon</u>						
17	1.5	7.5	5.73	.27	5.73	.21
25	2.5	7.5	5.88	.25	6.02	.12
17	3.0	15.0	10.90	.31	10.98	.17
25	5.0	15.0	11.38	.22	11.42	.20
Average			8.47		8.54	
General average			8.36		8.29	

No significant difference between sirup treatments.

- (a) Percent of total net weight.
- (b) The sugar sirup was 60.0° B and 60.7° B for Michigan and Oregon, respectively.
- (c) 75 percent sugar sirup and 25 percent corn sirup by weight.
- (d) The corn sirup was 59.9° B and 60.4° B for Michigan and Oregon, respectively.
- (e) Each datum represents the average of six replicates.
- (f) Standard deviation.

• **Prüfungsausschuss** (Prüfungsausschuss) ist ein Gremium, das die Aufgaben der Prüfungsausschüsse wahrnimmt. Es besteht aus den Mitgliedern der Prüfungsausschüsse und dem Vorsitzenden der Prüfungsausschüsse. Der Prüfungsausschuss ist für die Durchführung der Prüfungsausschüsse zuständig. Er ist für die Durchführung der Prüfungsausschüsse zuständig. Er ist für die Durchführung der Prüfungsausschüsse zuständig.

• **Prüfungsausschuss** (Prüfungsausschuss) ist ein Gremium, das die Aufgaben der Prüfungsausschüsse wahrnimmt. Es besteht aus den Mitgliedern der Prüfungsausschüsse und dem Vorsitzenden der Prüfungsausschüsse. Der Prüfungsausschuss ist für die Durchführung der Prüfungsausschüsse zuständig. Er ist für die Durchführung der Prüfungsausschüsse zuständig. Er ist für die Durchführung der Prüfungsausschüsse zuständig.

• **Prüfungsausschuss** (Prüfungsausschuss) ist ein Gremium, das die Aufgaben der Prüfungsausschüsse wahrnimmt. Es besteht aus den Mitgliedern der Prüfungsausschüsse und dem Vorsitzenden der Prüfungsausschüsse. Der Prüfungsausschuss ist für die Durchführung der Prüfungsausschüsse zuständig. Er ist für die Durchführung der Prüfungsausschüsse zuständig. Er ist für die Durchführung der Prüfungsausschüsse zuständig.

• **Prüfungsausschuss** (Prüfungsausschuss) ist ein Gremium, das die Aufgaben der Prüfungsausschüsse wahrnimmt. Es besteht aus den Mitgliedern der Prüfungsausschüsse und dem Vorsitzenden der Prüfungsausschüsse. Der Prüfungsausschuss ist für die Durchführung der Prüfungsausschüsse zuständig. Er ist für die Durchführung der Prüfungsausschüsse zuständig. Er ist für die Durchführung der Prüfungsausschüsse zuständig.

Table 14.
EFFECT OF PARTIAL REPLACEMENT OF SUGAR SIRUP WITH CORN SIRUP
ON THE DRAINED WEIGHTS OF RED RASPBERRIES

Packing Medium		Berries oz.	Sugar Sirup ^b Drained Weight oz.		Corn Sirup ^{cd} Drained Weight oz.	
$\frac{g}{p}$ ^a	oz.					
Michigan						
17	1.5	7.5	6.46 ^e	.10 ^f	6.38 ^e	.16 ^f
29	3.0	7.5	7.00	.08	6.96	.13
17	2.5	12.0	10.15	.14	10.09	.10
29	5.0	12.0	10.53	.12	10.61	.09
Average			8.54		8.51	
Oregon						
17	1.5	7.5	6.48	.21	6.32	.17
29	3.0	7.5	6.63	.14	6.78	.15
17	2.5	12.0	10.40	.23	10.25	.11
29	3.0	12.0	10.69	.13	10.54	.21
17	3.0	15.0	12.59	.45	12.88	.11
29	6.0	15.0	13.06	.22	13.11	.14
Average			9.98		9.98	
General Average			9.26		9.26	

No significant difference between sirup treatments.

- (a) Percent of total net weight.
- (b) The sugar sirup was 60.4° B and 60.8° B for Michigan and Oregon, respectively.
- (c) 75 percent sugar sirup and 25 percent corn sirup by weight.
- (d) The corn sirup was 61.1° B and 61.0° B for Michigan and Oregon, respectively.
- (e) Each datum represents the average of six replicates.
- (f) Standard deviation.

• Die Bedeutung der Sprache ist in der Literatur und in der Kunst von zentraler Bedeutung. Die Sprache ist das Medium, durch das wir unsere Gedanken und Gefühle ausdrücken können. In der Literatur wird die Sprache oft in einer Weise verwendet, die über den reinen Informationsgehalt hinausgeht und eine ästhetische Wirkung erzielt. In der Kunst wird die Sprache oft als Werkzeug zur Darstellung von Bildern und Ideen verwendet.

• Die Rolle der Sprache in der Gesellschaft ist ebenfalls von zentraler Bedeutung. Die Sprache ist das Mittel, durch das wir miteinander kommunizieren und unsere Beziehungen aufbauen können. In der Gesellschaft wird die Sprache oft verwendet, um Normen und Werte zu vermitteln und das Verhalten der Menschen zu steuern.

• Die Sprache als Werkzeug zur Darstellung von Bildern und Ideen ist ebenfalls von zentraler Bedeutung. In der Kunst wird die Sprache oft verwendet, um Bilder und Ideen darzustellen, die in Worten nicht fassbar sind. In der Literatur wird die Sprache oft verwendet, um Bilder und Ideen darzustellen, die in Worten nicht fassbar sind.

• Die Sprache als Werkzeug zur Darstellung von Bildern und Ideen ist ebenfalls von zentraler Bedeutung. In der Kunst wird die Sprache oft verwendet, um Bilder und Ideen darzustellen, die in Worten nicht fassbar sind.

• Die Sprache als Werkzeug zur Darstellung von Bildern und Ideen ist ebenfalls von zentraler Bedeutung. In der Kunst wird die Sprache oft verwendet, um Bilder und Ideen darzustellen, die in Worten nicht fassbar sind.

Table 15.
EFFECT OF PARTIAL REPLACEMENT OF SUGAR SIRUP WITH CORN SIRUP
ON THE SOLUBLE SOLIDS OF SLICED STRAWBERRIES

Packing Medium	Berries	Sugar Sirup ^b		Corn Sirup ^{cd}		
		Soluble Solids	Soluble Solids	Soluble Solids	Soluble Solids	
% ^a	oz.	oz.	%	%	%	%
<u>Michigan</u>						
17	1.5	7.5	14.7 ^e	.54 ^f	16.7 ^e	.97 ^f
25	2.5	7.5	20.6	.90	20.5	.47
17	2.4	12.0	16.0	.26	16.3	.14
25	4.0	12.0	21.0	.29	20.1	.13
17	3.0	15.0	16.5	.35	16.1	.29
25	5.0	15.0	20.8	.33	20.6	.24
Average			18.3		18.4	
<u>Oregon</u>						
17	1.5	7.5	19.5	.50	19.3	.43
25	2.5	7.5	22.5	1.82	23.2	.35
17	3.0	15.0	19.1	.21	18.2	.04
25	5.0	15.0	23.0	.25	22.9	.25
Average			21.0		20.9	
General average			19.7		19.7	

No significant difference between sirup treatments.

-
- (a) Percent of total net weight.
 - (b) The sugar sirup was 60.0° B and 60.7° B for Michigan and Oregon, respectively.
 - (c) 75 percent sugar sirup and 25 percent corn sirup by weight.
 - (d) The corn sirup was 59.9° B and 60.4° B for Michigan and Oregon, respectively.
 - (e) Each datum represents the average of six replicates.
 - (f) Standard deviation.

Table 16.
EFFECT OF PARTIAL REPLACEMENT OF SUGAR SIRUP WITH CORN SIRUP
ON THE SOLUBLE SOLIDS OF RED RASPBERRIES

Packing Medium		Berries oz.	Sugar Sirup ^b Soluble Solids		Corn Sirup ^{cd} Soluble Solids	
% ^a	oz.		%		%	
Michigan						
17	1.5	7.5	19.5 ^e	.22 ^f	19.8 ^e	.34 ^f
29	3.0	7.5	25.4	.38	25.5	.47
17	2.5	12.0	19.6	.74	19.5	.21
29	5.0	12.0	26.0	.21	26.0	.12
Average			22.6		22.7	
Oregon						
17	1.5	7.5	18.2	.33	18.1	.55
29	3.0	7.5	23.9	.58	24.6	.24
17	2.5	12.0	18.8	.49	18.6	.25
29	5.0	12.0	25.1	.18	24.7	.17
17	3.0	15.0	18.1	.31	18.4	.55
29	6.0	15.0	24.3	.41	24.2	.19
Average			21.4		21.4	
General average			22.0		22.1	

No significant difference between sirup treatments.

- (a) Percent of total net weight.
- (b) The sugar sirup was 60.4° B and 60.8° B for Michigan and Oregon, respectively.
- (c) 75 percent sugar sirup and 25 percent corn sirup by weight.
- (d) The corn sirup was 61.1° B and 61.0° B for Michigan and Oregon, respectively.
- (e) Each datum represents the average of six replicates.
- (f) Standard deviation.

• $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (one quarter of the area)
 • $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ (one eighth of the area)
 • $\frac{1}{2} \times \frac{1}{8} = \frac{1}{16}$ (one sixteenth of the area)
 • $\frac{1}{2} \times \frac{1}{16} = \frac{1}{32}$ (one thirty second of the area)

Figure 1. The effect of the number of trials on the number of correct responses. The number of correct responses was significantly higher than the number of incorrect responses in all cases. The number of correct responses was significantly higher than the number of incorrect responses in all cases. The number of correct responses was significantly higher than the number of incorrect responses in all cases.

1. *Journal of the American Medical Association*, 1997; 277: 1039-1043.

Table 17.
EFFECT OF PARTIAL REPLACEMENT OF SUGAR SIRUP WITH CORN SIRUP ON THE SOLUBLE SOLIDS
OF DRAINED SLICED STRAWBERRIES AND LIQUID

Packing Medium % ^a	oz.	Berries oz.	Drained Berries		Drained Liquid			
			Sugar ^b	Corn ^c	Sugar ^b	Corn ^c		
			Soluble Solids %	Soluble Solids %	Soluble Solids %	Soluble Solids %		
Michigan								
17	1.5	7.5	9.6 ^e	.45 ^f	22.3 ^e	.86 ^f	25.2 ^e	.74 ^f
25	2.5	7.5	10.5	.61	31.2	.74	29.8	.80
17	2.4	12.0	10.2	.20	24.7	.50	23.3	.94
25	4.0	12.0	11.0	.34	27.2	.99	28.2	.56
17	3.0	15.0	11.4	.44	21.4	.72	20.7	.72
25	5.0	15.0	13.3	.31	26.8	1.28	27.2	.54
Average			11.0		25.6		25.7	
Oregon								
17	1.5	7.5	15.6	.40	24.9	.82	24.5	.38
25	2.5	7.5	18.2	.19	30.2	.67	31.1	.62
17	3.0	15.0	16.0	.26	22.9	.77	22.2	.27
25	5.0	15.0	17.6	.42	29.5	.63	29.3	.63
Average			16.9		26.9		26.8	
General Average			13.3		26.1		26.2	
No significant difference between sirup treatments.								

(a) Percent of total net weight.

(b) The sugar sirup was 60.0° B and 60.7° B for Michigan and Oregon, respectively.

(c) 75 percent sugar sirup and 25 corn sirup by weight.

(d) The corn sirup was 59.9° B and 60.4° B for Michigan and Oregon, respectively.

(e) Each datum represents the average of six replicates.

(f) Standard deviation.

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

Table 18.
EFFECT OF PARTIAL REPLACEMENT OF SUGAR SIRUP WITH CORN SIRUP ON THE SOLUBLE SOLIDS
OF DRAINED RED RASPBERRIES AND LIQUID

Packing Medium % ^a	Berries oz.	Soluble Solids, berries		Soluble Solids, liquid	
		Sugar ^b %	Corn ^{cd} %	Sugar ^b %	Corn ^{cd} %
Michigan					
17	1.5	15.7 ^e	.42 ^f	27.5 ^e	.49 ^f
29	3.0	19.0	.59	37.6	.78
17	2.5	15.1	.28	29.1	.97
29	5.0	17.6	.55	38.5	.70
Average		16.9		33.2	
Oregon					
17	1.5	12.3	.37	31.1	.83
29	3.0	13.7	.62	39.1	1.05
17	2.5	13.2	.22	30.9	1.36
29	5.0	15.1	.31	40.3	.86
17	3.0	12.8	.59	29.3	1.40
29	6.0	14.7	.44	38.6	1.17
Average		13.6		34.9	
General average		14.9		34.2	
No significant difference between sirup treatments.					

(a) Percent of total net weight.

(b) The sugar sirup was 60.4° B and 60.8° B for Michigan and Oregon, respectively.

(c) 75 percent sugar sirup and 25 percent corn sirup by weight.

(d) The corn sirup was 61.1° B and 61.0° B for Michigan and Oregon, respectively.

(e) Each datum represents the average of six replicates.

(f) Standard deviation.

• • • • •

• • • • •

• • • • •

• • • • •

• • • • •

• • • • •

• • • • •

• • • • •

• • • • •

• • • • •

Table 19.
EFFECT OF THAWING BY MEANS OF MOVING WATER AND MOVING AIR AT 68° F.
ON THE DRAINED WEIGHTS OF SLICED STRAWBERRIES

Packing Medium			Berries oz.	Water Thaw Drained Weight		Air Thaw Drained Weight	
° Brix	% ^a	oz.		oz.		oz.	
0	17	1.5	7.5	5.27 ^b	.09 ^c	5.07 ^b	.07 ^c
	25	2.5	7.5	5.13	.18	4.77	.17
	17	2.4	12.0	8.44	.25	8.13	.43
	25	4.0	12.0	7.38	.25	6.92	.13
	17	3.0	15.0	9.38	.38	8.86	.24
	25	5.0	15.0	9.15	.23	8.69	.34
Average				7.46		7.07	
50.2	17	1.5	7.5	5.67	.20	5.54	.10
	25	2.5	7.5	5.94	.13	5.65	.12
	17	2.4	12.0	8.42	.20	8.32	.15
	25	4.0	12.0	8.40	.24	8.40	.22
	17	3.0	15.0	10.69	.43	9.56	.40
	25	5.0	15.0	9.82	.23	8.98	.15
Average				8.16		7.74	
60	17	1.5	7.5	5.94	.10	5.73	.12
	25	2.5	7.5	5.73	.09	5.69	.23
	17	2.4	12.0	9.04	.19	8.71	.23
	25	4.0	12.0	7.96	.19	8.09	.27
	17	3.0	15.0	10.11	.21	9.48	.09
	25	5.0	15.0	10.09	.44	9.77	.18
Average				8.15		7.91	
100	17	1.5	7.5	5.38	.20	4.92	.10
	20	1.9	7.5	5.11	.18	4.82	.13
	17	2.4	12.0	8.44	.20	8.23	.12
	20	3.0	12.0	8.50	.26	8.44	.22
	17	3.0	15.0	10.19	.21	9.52	.12
	20	3.8	15.0	9.86	.16	9.54	.13
Average				7.91		7.58	
General Average				7.92		7.58	
LSD between thawing treatments				5% .05; 1% .07			

(a) Percent of total net weight.

(b) Each datum represents the average of six replicates.

(c) Standard deviation.

Table 20.
EFFECT OF THAWING BY MEANS OF MOVING WATER AND MOVING AIR AT 68° F.
ON DRAINED WEIGHT OF RED RASPBERRIES

Packing Medium			Berries oz.	Water Thaw Drained Weight		Air Thaw Drained Weight	
° Brix	% ^a	oz.		oz.		oz.	
0	17	1.5	7.5	6.06 ^b	.11 ^c	6.21 ^b	.06 ^c
	29	3.0	7.5	6.36	.05	6.48	.05
	17	2.5	12.0	9.78	.12	9.52	.05
	29	5.0	12.0	9.98	.14	9.82	.13
Average				8.05		8.01	
50.4	17	1.5	7.5	6.27	.05	6.50	.14
	29	3.0	7.5	6.84	.10	6.88	.11
	17	2.5	12.0	9.73	.37	9.55	.10
	29	5.0	12.0	10.34	.07	10.34	.13
Average				8.30		8.32	
60.4	17	1.5	7.5	6.46	.10	6.61	.12
	29	3.0	7.5	7.00	.08	6.92	.10
	17	2.5	12.0	10.15	.14	9.67	.15
	29	5.0	12.0	10.53	.12	10.34	.13
Average				8.54		8.39	
100	17	1.5	7.5	6.48	.09	6.44	.13
	20	1.9	7.5	6.69	.10	6.54	.10
	17	2.5	12.0	9.96	.22	9.32	.13
	20	3.0	12.0	10.07	.31	9.36	.14
Average				8.30		7.92	
General Average				8.29		8.16	
No significant difference between thawing treatments.							

(a) Percent of total net weight.

(b) Each datum represents the average of six replicates.

(c) Standard deviation.

• The first part of the document is a list of the names of the people who were present at the meeting. This list is organized alphabetically by last name.

• The second part of the document is a list of the topics that were discussed during the meeting. These topics are listed in the order in which they were discussed.

• The third part of the document is a list of the actions that were taken during the meeting. These actions are listed in the order in which they were taken.

• The fourth part of the document is a list of the people who were responsible for carrying out the actions that were taken during the meeting. These people are listed in the order in which they were assigned the actions.

• The fifth part of the document is a list of the people who were responsible for monitoring the progress of the actions that were taken during the meeting. These people are listed in the order in which they were assigned the monitoring tasks.

• The sixth part of the document is a list of the people who were responsible for reporting the progress of the actions that were taken during the meeting. These people are listed in the order in which they were assigned the reporting tasks.

• The seventh part of the document is a list of the people who were responsible for evaluating the results of the actions that were taken during the meeting. These people are listed in the order in which they were assigned the evaluation tasks.

• The eighth part of the document is a list of the people who were responsible for implementing the actions that were taken during the meeting. These people are listed in the order in which they were assigned the implementation tasks.

• The ninth part of the document is a list of the people who were responsible for maintaining the records of the actions that were taken during the meeting. These people are listed in the order in which they were assigned the record-keeping tasks.

• The tenth part of the document is a list of the people who were responsible for distributing the information that was generated during the meeting. These people are listed in the order in which they were assigned the distribution tasks.

The greater effect shown by the sliced strawberries was probably due to the greater loss of juice from the cut flesh of the sliced berries because of the longer length of time necessary for the berries to thaw by moving air.

Soluble Solids. The soluble solids of the mixture of sliced strawberries and sweetener used in this series showed no significant difference between thawing methods (Table 21). Therefore, the data are comparable.

The soluble solids of the water-thawed drained sliced strawberries which were packed in sirup and dry sugar were significantly lower than those which were air-thawed (Table 22). The opposite was true for the drained liquid. In this case, the water-thawed samples had the highest soluble solids except for the water packs, which showed no difference. Thawing by means of moving air was a longer process than the water thawing procedure and probably this factor was the reason for the difference in soluble solids. When air-thawing, the berries and the sirup were in contact for a longer period of time; hence, there was a greater possibility of approaching equilibrium.

The sliced strawberries which were packed in a water medium showed an opposite effect from the sirup and dry sugar packs. The soluble solids of the water-thawed drained sliced strawberries which were packed in water were significantly higher than the air-thawed samples. These packs showed this opposite effect because the water did not contain any soluble solids to diffuse into the berries. There was no difference in soluble solids of the drained liquid as

Table 21.
EFFECT OF THAWING BY MEANS OF MOVING WATER AND MOVING AIR AT 68° F.
ON THE SOLUBLE SOLIDS OF SLICED STRAWBERRIES

Packing Medium			Berries oz.	Water Thaw Soluble Solids		Air Thaw Soluble Solids	
° Brix	% ^a	oz.		%		%	
9	17	1.5	7.5	5.3 ^b	.17 ^c	5.1 ^b	.14 ^c
	25	2.5	7.5	4.8	.18	4.8	.26
	17	2.4	12.0	5.0	.24	5.4	.27
	25	4.0	12.0	4.4	.16	4.6	.15
	17	3.0	15.0	5.5	.23	5.2	.10
	25	5.0	15.0	5.0	.04	4.7	.22
Average				5.0		5.0	
50.2	17	1.5	7.5	14.8	.68	14.0	.11
	25	2.5	7.5	17.3	.26	17.2	.28
	17	2.4	12.0	14.3	.19	14.9	.34
	25	4.0	12.0	18.1	.08	18.1	.13
	17	3.0	15.0	14.0	.20	14.5	.29
	25	5.0	15.0	17.8	.33	18.3	.22
Average				16.1		16.2	
60	17	1.5	7.5	14.7	.54	15.0	.55
	25	2.5	7.5	20.6	.90	19.5	.49
	17	2.4	12.0	16.0	.26	16.6	.36
	25	4.0	12.0	21.0	.29	21.1	.52
	17	3.0	15.0	16.5	.35	16.5	.43
	25	5.0	15.0	20.8	.34	21.0	.17
Average				18.3		18.3	
100	17	1.5	7.5	22.0	.68	22.3	.75
	20	1.9	7.5	23.9	1.54	24.5	.94
	17	2.4	12.0	23.0	.77	23.9	.33
	20	3.0	12.0	25.1	.64	25.4	.69
	17	3.0	15.0	22.2	.18	22.8	.50
	20	3.8	15.0	26.2	.59	25.9	.31
Average				23.7		24.1	
General Average				15.8		15.9	
No significant difference between thawing treatments.							

(a) Percent of total net weight.

(b) Each datum represents the average of six replicates.

(c) Standard deviation.

Table 22.
EFFECT OF THAWING BY MEANS OF MOVING WATER AND MOVING AIR AT 68° F.
ON THE SOLUBLE SOLIDS OF DRAINED SLICED STRAWBERRIES AND LIQUID

Packing Medium	°Brix	Berries		Soluble Solids, berries				Soluble Solids, liquid			
		% ^a	oz.	Water	Air	Water	Air	Water	Air	Water	Air
				%	%	%	%	%	%	%	%
0	17	1.5	7.5	5.4 ^b	.21 ^c	5.3 ^b	.08 ^c	4.9 ^b	.09 ^c	4.7 ^b	.17 ^c
	25	2.5	7.5	5.3	.24	5.0	.17	4.0	.12	4.1	.19
	17	2.4	12.0	5.6	.27	5.6	.31	4.3	.12	4.7	.22
	25	4.0	12.0	5.0	.04	4.8	.18	4.0	.05	4.2	.15
	17	3.0	15.0	6.0	.00	5.9	.08	4.7	.15	4.7	.13
	25	5.0	15.0	5.4	.21	5.1	.16	4.2	.10	4.2	.05
	Average			5.5		5.3		4.4		4.4	
50.2	17	1.5	7.5	10.1	.43	9.7	.31	20.6	1.18	19.6	1.08
	25	2.5	7.5	10.1	.08	10.0	1.03	26.8	.71	25.8	.59
	17	2.4	12.0	10.1	.53	12.2	.30	19.3	.87	17.3	.12
	25	4.0	12.0	10.9	.41	13.8	.73	22.9	1.14	22.3	.64
	17	3.0	15.0	11.1	.50	11.6	.26	17.9	.70	17.3	.55
	25	5.0	15.0	11.8	.31	12.8	.34	22.6	.70	22.1	.53
	Average			10.7		11.7		21.7		20.7	
60	17	1.5	7.5	9.6	.45	10.1	.90	22.3	.86	23.0	1.52
	25	2.5	7.5	10.5	.61	11.0	.53	31.2	.74	29.7	.95
	17	2.4	12.0	10.2	.20	13.4	.29	24.7	.50	20.5	.59
	25	4.0	12.0	11.0	.34	14.3	.64	27.2	.99	24.8	.89
	17	3.0	15.0	11.4	.44	12.7	.12	21.4	.72	20.2	.75
	25	5.0	15.0	13.3	.31	14.3	.50	26.8	1.28	26.3	.73
	Average			11.0		12.6		25.6		24.1	
100	17	1.5	7.5	16.8	.45	17.9	1.11	29.3	1.59	26.8	1.15
	20	1.9	7.5	17.6	1.09	18.8	1.39	31.1	1.96	29.4	1.26
	17	2.4	12.0	17.0	1.48	19.4	1.26	29.3	1.17	29.0	.94
	20	3.0	12.0	17.1	1.42	21.4	.71	33.8	1.07	29.9	1.86
	17	3.0	15.0	16.4	.66	18.4	1.00	29.2	.74	27.4	.61
	20	3.8	15.0	18.6	1.34	20.9	.73	32.9	1.01	30.0	.66
	Average			17.3		19.5		30.9		28.8	
General Average				11.1		12.3		20.7		19.5	
LSD between thawing treatments:				soluble solids, fruit 5% <u>.15</u> soluble solids, liquid 5% <u>.20</u> ; 1% <u>.27</u>							

- (a) Percent of total net weight.
(b) Each datum represents the average of six replicates.
(c) Standard deviation.

[illegible]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	52
--	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----

[illegible]

Case	Age	Sex	Duration	Location	Occupation	History	Examination	Diagnosis	Treatment	Outcome
1	25	Male	10 years	Urban	Teacher	None	Normal	Normal	None	Normal
2	30	Female	5 years	Rural	Farmer	Headache	Normal	Normal	None	Normal
3	35	Male	15 years	Urban	Engineer	None	Normal	Normal	None	Normal
4	40	Female	20 years	Rural	Homemaker	Headache	Normal	Normal	None	Normal
5	45	Male	25 years	Urban	Doctor	None	Normal	Normal	None	Normal
6	50	Female	30 years	Rural	Teacher	Headache	Normal	Normal	None	Normal
7	55	Male	35 years	Urban	Engineer	None	Normal	Normal	None	Normal
8	60	Female	40 years	Rural	Homemaker	Headache	Normal	Normal	None	Normal
9	65	Male	45 years	Urban	Doctor	None	Normal	Normal	None	Normal
10	70	Female	50 years	Rural	Teacher	Headache	Normal	Normal	None	Normal

would be expected. This was due to variation in composition of the raw product.

The soluble solids of the mixture of red raspberries and sweetener used in this series showed a significant difference between thawing methods (Table 23). Therefore, it is evident that there was a variation in composition of the raw product. This explains why the soluble solids data were so erratic and inconsistent (Table 24) and is further substantiated by the standard deviations.

These data (Table 24) indicate no significant difference in soluble solids of the drained red raspberries between thawing treatments. The soluble solids of the drained liquid showed a significant difference at the 5 and 1 percent levels.

The drained liquid from red raspberries which were packed in a water medium and thawed by means of moving water gave a significantly lower soluble solids than similar packs which were air-thawed. The soluble solids of the drained liquid from red raspberries which had been packed in sirup and dry sugar and water-thawed were significantly higher than the air-thawed samples.

Effect of Extended Thaw-time in Moving Water

The purpose of this series was to determine what effect extended thaw-time would have upon the drained weights and soluble solids of the thawed sliced strawberries which have been packed in 60° Brix sirup and dry sugar.

Table 23.
EFFECT OF THAWING BY MEANS OF MOVING WATER AND MOVING AIR AT 68° F.
ON THE SOLUBLE SOLIDS OF RED RASPBERRIES

Packing Medium			Berries oz.	Water Thaw Soluble Solids		Air Thaw Soluble Solids	
° Brix	% ^a	oz.		%		%	
0	17	1.5	7.5	10.2 ^b	.08 ^c	10.1 ^b	.22 ^c
	29	3.0	7.5	9.5	.34	9.2	.26
	17	2.5	12.0	10.1	.10	10.4	.48
	29	5.0	12.0	9.5	.23	9.5	.37
Average				9.8		9.8	
50.4	17	1.5	7.5	14.5	.28	15.6	.47
	29	3.0	7.5	18.0	.59	18.2	.35
	17	2.5	12.0	14.2	.04	14.4	.35
	29	5.0	12.0	16.1	.20	16.8	.80
Average				15.7		16.3	
60.4	17	1.5	7.5	15.7	.42	16.5	.51
	29	3.0	7.5	19.0	.59	20.1	.54
	17	2.5	12.0	15.1	.28	15.1	.35
	29	5.0	12.0	17.6	.55	18.6	.47
Average				16.9		17.6	
100	17	1.5	7.5	19.0	.63	19.4	.58
	20	1.9	7.5	20.5	.62	18.8	2.33
	17	2.5	12.0	17.3	.92	18.6	.60
	20	3.0	12.0	18.9	1.37	19.5	.75
Average				18.9		19.1	
General Average				15.3		15.7	

LSD between thawing treatments 5% .15; 1% .20.

- (a) Percent of total net weight.
 (b) Each datum represents the average of six replicates.
 (c) Standard deviation.

Table 24.

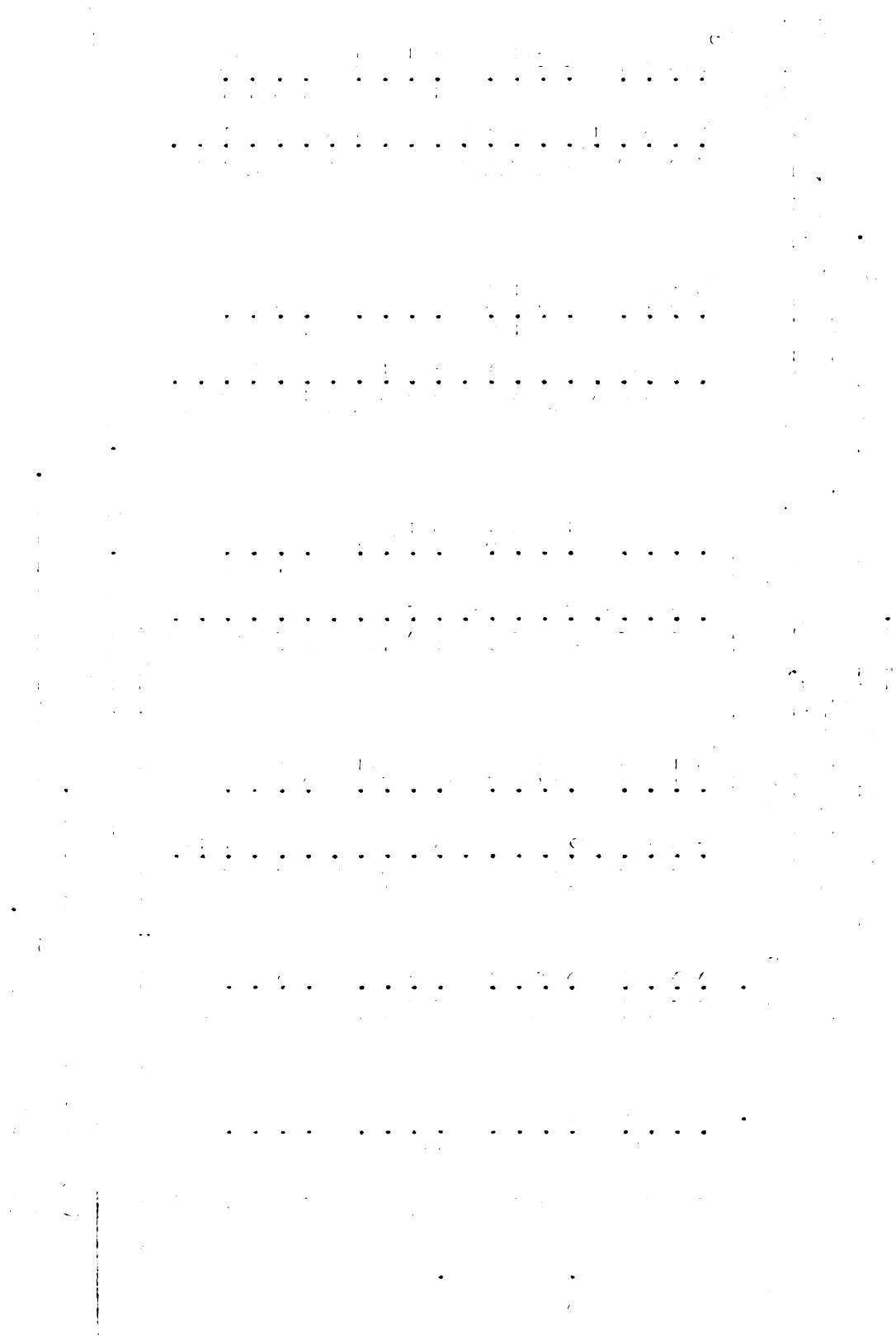
**EFFECT OF THAWING BY MEANS OF MOVING WATER AND MOVING AIR AT 68° F.
ON THE SOLUBLE SOLIDS OF DRAINED RED RASPBERRIES AND LIQUID**

Packing Medium oz Brix	Medium oz.	Berries oz.	Soluble Solids, berries		Soluble Solids, liquid	
			Water %	Air %	Water %	Air %
0	17 1.5	7.5	8.7 ^b	8.8 ^b	7.2 ^b	7.0 ^b
	29 3.0	7.5	7.9	7.5	5.6	5.6
	17 2.5	12.0	8.8	8.9	5.4	6.7
	29 5.0	12.0	7.2	7.4	4.3	5.2
Average			8.2	8.2	5.6	6.1
50.4	17 1.5	7.5	18.0	17.7	24.2	22.4
	29 3.0	7.5	23.1	22.6	30.9	30.0
	17 2.5	12.0	18.0	17.9	25.0	23.4
	29 5.0	12.0	22.6	22.7	32.0	31.4
Average			20.4	20.2	28.0	26.8
60.4	17 1.5	7.5	19.5	19.9	27.5	26.6
	29 3.0	7.5	25.4	25.7	37.6	35.2
	17 2.5	12.0	19.6	19.5	29.1	27.0
	29 5.0	12.0	26.0	26.2	38.5	37.1
Average			22.6	22.8	33.2	31.5
100	17 1.5	7.5	24.5	25.4	41.0	42.1
	20 1.9	7.5	27.3	27.1	46.2	44.3
	17 2.5	12.0	25.4	25.3	42.4	36.7
	20 3.0	12.0	27.1	27.2	43.9	41.8
Average			26.1	26.3	43.4	41.2
General Average			19.3	19.4	27.6	26.4
LSD between thawing treatments:			soluble solids, fruit NSD			
			soluble solids, liquid 5% .19; 1% .25			

(a) Percent of total net weight.

(b) Each datum represents the average of six replicates.

(c) Standard deviation.



Drained Weights. For both packs, the 60° Brix and the dry sugar, the drained weights were significantly lower when the thaw-time was extended two hours. However, the four hour extended thaw-time was not significantly different from the two hour extended thaw-time (Table 25).

Soluble Solids. The soluble solids of the sliced strawberries packed in dry sugar and used in this series showed no significant difference between extended thaw-time treatments (Table 26). However, the sliced strawberries packed in 60° Brix medium showed a significant difference. This difference was probably due to difference in the fresh berries.

The soluble solids of the drained sliced strawberries (Table 27) were not significantly higher at normal thaw-time plus two hours, but were significantly higher at normal thaw-time plus four hours additional thaw-time.

The soluble solids of the drained liquid (Table 28) from the series packed in 60° Brix were not significantly lower at two hours extended thaw-time, but were at the four hour level. The dry sugar packs were significantly lower at the two hour extended thaw-time level.

The literature (10) (12) reported that thawing temperatures are necessary for the soluble solids of the fruit to become equal to that of the sirup. It also reported that the soluble solids ratio could serve as an excellent thaw index. The data obtained as a result of these determinations indicate that if these types of data are to be used for this purpose a definite length of thaw-time must be established.

1. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (Probability of getting two heads)
 2. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (Probability of getting two tails)
 3. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (Probability of getting one head and one tail)
 4. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (Probability of getting one tail and one head)

Therefore, the probability of getting two heads is $\frac{1}{4}$.

Example 2: A bag contains 3 red balls and 2 blue balls. What is the probability of drawing a red ball?

Solution: Total number of balls = 3 (red) + 2 (blue) = 5 balls.
 Number of red balls = 3.
 Probability of drawing a red ball = $\frac{\text{Number of red balls}}{\text{Total number of balls}} = \frac{3}{5}$.

Example 3: A die is rolled. What is the probability of getting a 6?

Solution: Total number of outcomes = 6 (1, 2, 3, 4, 5, 6).
 Number of favorable outcomes (getting a 6) = 1.
 Probability of getting a 6 = $\frac{1}{6}$.

Example 4: A card is drawn from a standard deck of 52 cards. What is the probability of drawing a heart?

Solution: Total number of cards = 52.
 Number of hearts = 13.
 Probability of drawing a heart = $\frac{13}{52} = \frac{1}{4}$.

Example 5: A spinner is divided into 8 equal sections, 3 of which are red and 5 are blue. What is the probability of landing on red?

Solution: Total number of sections = 8.
 Number of red sections = 3.
 Probability of landing on red = $\frac{3}{8}$.

Example 6: A box contains 10 marbles, 4 of which are green and 6 are yellow. What is the probability of drawing a green marble?

Solution: Total number of marbles = 10.
 Number of green marbles = 4.
 Probability of drawing a green marble = $\frac{4}{10} = \frac{2}{5}$.

Example 7: A coin is tossed 10 times. What is the probability of getting exactly 5 heads?

Solution: Total number of possible outcomes = $2^{10} = 1024$.
 Number of outcomes with exactly 5 heads = $\binom{10}{5} = 252$.
 Probability of getting exactly 5 heads = $\frac{252}{1024} = \frac{63}{256}$.

Example 8: A bag contains 10 balls, numbered 1 to 10. What is the probability of drawing a ball with a number greater than 5?

Solution: Total number of balls = 10.
 Number of balls with numbers greater than 5 = 5 (6, 7, 8, 9, 10).
 Probability of drawing a ball with a number greater than 5 = $\frac{5}{10} = \frac{1}{2}$.

Example 9: A die is rolled twice. What is the probability of getting a 6 on the first roll and a 1 on the second roll?

Solution: Probability of getting a 6 on the first roll = $\frac{1}{6}$.
 Probability of getting a 1 on the second roll = $\frac{1}{6}$.
 Probability of getting a 6 on the first roll and a 1 on the second roll = $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$.

Example 10: A box contains 10 balls, 3 of which are red and 7 are blue. What is the probability of drawing a red ball and then a blue ball, without replacement?

Solution: Probability of drawing a red ball first = $\frac{3}{10}$.
 After drawing a red ball, there are 9 balls left, 2 red and 7 blue.
 Probability of drawing a blue ball second = $\frac{7}{9}$.
 Probability of drawing a red ball and then a blue ball = $\frac{3}{10} \times \frac{7}{9} = \frac{7}{30}$.

Table 25.
EFFECT OF EXTENDED THAW TIME
IN MOVING WATER ON THE DRAINED WEIGHTS OF SLICED STRAWBERRIES

Packing Medium	Berries	Normal Thaw Drained Weight	Thaw plus Two Hours Drained Weight	Thaw plus Four Hours Drained Weight
O Brix %	Oz.	Oz.	Oz.	Oz.
60	7.5	5.73 ^b	5.36 ^b	5.57 ^b
25	7.5	5.69	5.36	5.30
25	12.0	7.96	7.94	7.98
29	12.0	8.50	7.98	8.21
25	15.0	10.09	10.06	9.88
29	15.0	10.34	10.29	10.13
Average		8.05	7.83	7.85
ISD between extended thaw-time treatments	5%	.14;	1%	.18
100	7.5	5.38	4.94	4.92
20	7.5	5.11	4.80	4.86
17	12.0	8.44	8.23	8.17
20	12.0	8.50	7.96	8.11
17	15.0	10.19	9.83	9.54
20	15.0	9.86	9.50	9.59
Average		7.91	7.54	7.53
ISD between extended thaw-time treatments	5%	.13;	1%	.17

(a) Percent of total net weight.
(b) Each datum represents the average of six replicates.
(c) Standard deviation.

Table 26.
EFFECT OF EXTENDED THAW TIME
IN MOVING WATER ON THE SOLUBLE SOLIDS OF SLICED STRAWBERRIES

Packing Medium ° Brix	Berries oz.	Normal Thaw Soluble Solids %	Thaw plus Two Hours Soluble Solids %	Thaw plus Four Hours Soluble Solids %
60	25	20.6 ^b	20.0 ^b	19.8 ^b
	7.5	.90 ^c	.85 ^c	.86 ^c
29	7.5	23.5	22.8	23.0
25	12.0	21.0	20.7	20.5
29	12.0	22.8	22.9	23.2
25	15.0	20.8	20.0	20.4
29	15.0	23.0	22.7	22.9
Average		22.0	21.5	21.6
LSD between extended thaw time treatments 5% .27; 1% .36				
100	17	22.0	22.5	22.4
	7.5	.68	.49	1.26
20	7.5	23.9	24.9	24.7
17	12.0	23.0	23.2	23.2
20	12.0	25.1	24.2	25.8
17	15.0	22.2	22.3	22.3
20	15.0	26.2	26.0	25.2
Average		23.7	23.9	23.9
No significant difference between extended thaw time treatments.				

- (a) Percent of total net weight.
 (b) Each datum represents the average of six replicates.
 (c) Standard deviation.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Table 27.
EFFECT OF EXTENDED THAW TIME IN MOVING WATER
ON THE SOLUBLE SOLIDS OF DRAINED SLICED STRAWBERRIES

Packing Medium o Brix	Medium %a	Berries oz.	Normal Thaw Soluble Solids %	Thaw plus Two Hours Soluble Solids %	Thaw plus Four Hours Soluble Solids %
60	25	7.5	10.5 ^b	10.9 ^b	11.0 ^b
	29	7.5	11.2	11.0	12.1
	25	12.0	11.0	11.7	13.0
	29	12.0	11.5	12.4	12.7
	25	15.0	13.3	13.0	13.5
	29	15.0	14.8	13.2	13.7
Average			12.1	12.0	12.7
ISD between extended thaw time treatments 5% .24; 1% .32					
100	17	7.5	16.8	17.2	17.9
	20	7.5	17.6	18.2	19.3
	17	12.0	17.0	17.1	18.5
	20	12.0	17.1	17.3	20.0
	17	15.0	16.4	16.8	17.2
	20	15.0	18.6	18.8	20.4
Average			17.3	17.6	18.9
ISD between extended thaw time treatments 5% .47; 1% .63					
			.45	.62	.46
			1.09	.29	1.28
			1.48	1.06	1.18
			1.42	.45	1.39
			.66	.84	.39
			1.34	1.03	1.42

- (a) Percent of total net weight.
(b) Each datum represents the average of six replicates.
(c) Standard deviation.

Table 28.
EFFECT OF EXTENDED THAW TIME IN MOVING WATER
ON THE SOLUBLE SOLIDS OF DRAINED LIQUID FROM SLICED STRAWBERRIES

Packing Medium o Brix	% ^a	Berries oz.	Normal Thaw		Thaw plus Two Hours		Thaw plus Four Hours	
			Soluble Solids		Soluble Solids		Soluble Solids	
			%		%		%	
60	25	7.5	31.2 ^b	.74 ^c	29.2 ^b	.65 ^c	29.6 ^b	.99 ^c
	29	7.5	34.1	.54	32.2	.88	31.9	.86
	25	12.0	27.2	.99	28.4	.77	27.7	.75
	29	12.0	31.1	1.87	31.1	1.07	30.7	1.61
	25	15.0	26.8	1.28	26.8	1.32	26.2	.86
	29	15.0	29.8	.39	30.8	.51	30.1	.63
Average			30.0		29.8		29.4	
ISD between extended thaw time treatments			5% .47; 1% .62					
100	17	7.5	29.3	1.59	27.3	1.07	26.6	1.52
	20	7.5	31.1	1.96	31.5	.57	29.9	1.02
	17	12.0	29.3	1.17	29.7	.94	29.1	1.24
	20	12.0	33.8	1.07	30.9	.75	31.6	1.75
	17	15.0	29.2	.74	28.3	.78	27.4	.52
	20	15.0	32.9	1.01	32.3	.77	28.9	1.29
Average			30.9		30.0		28.9	
ISD between extended thaw time treatments			5% .55; 1% .73					

- (a) Percent of total net weight.
(b) Each datum represents the average of six replicates.
(c) Standard deviation.

SUMMARY AND CONCLUSIONS

A study was made to provide more scientific information on the effect of certain packing factors on drained weights and soluble solids of frozen sliced strawberries and frozen red raspberries in Michigan and Oregon.

On the basis of data obtained, the following conclusions can be made concerning drained weights:

1. Frozen sliced strawberries and red raspberries packed without packing medium had average drained weight:put-in weight ratios of approximately 67 percent and 77 percent, respectively.

2. Frozen sliced strawberries and frozen red raspberries packed in a water medium gave lower drained weights than those packed in sirup and dry sugar media. There was no difference in drained weights between 50° Brix and 60° Brix packs.

3. With exception of Michigan strawberries, highest drained weights were obtained when maximum amounts of packing medium were used when calculated as percentage of in-going berry weight. When expressed as percentage of total net weight, lower values were obtained for maximum amounts of packing medium.

4. Drained weight ratios decreased as size of container increased.

5. There was no difference in drained weights between sucrose sirup packs and sucrose corn sirup packs.

6. Drained weights of water-thawed sliced strawberries were higher than those thawed by moving air; there was no difference in

1. *Die Bedeutung der Sprache in der Kultur*
 2. *Die Rolle der Sprache in der Gesellschaft*
 3. *Die Funktion der Sprache in der Wissenschaft*
 4. *Die Sprache als Werkzeug der Kommunikation*
 5. *Die Sprache als Ausdruck der Identität*
 6. *Die Sprache als Medium der Kultur*
 7. *Die Sprache als Spiegel der Gesellschaft*
 8. *Die Sprache als Werkzeug der Erkenntnis*
 9. *Die Sprache als Ausdruck der Emotion*
 10. *Die Sprache als Medium der Kunst*
 11. *Die Sprache als Werkzeug der Politik*
 12. *Die Sprache als Ausdruck der Philosophie*
 13. *Die Sprache als Medium der Religion*
 14. *Die Sprache als Werkzeug der Medizin*
 15. *Die Sprache als Ausdruck der Ethik*
 16. *Die Sprache als Medium der Literatur*
 17. *Die Sprache als Werkzeug der Pädagogik*
 18. *Die Sprache als Ausdruck der Psychologie*
 19. *Die Sprache als Medium der Soziologie*
 20. *Die Sprache als Werkzeug der Ökonomie*
 21. *Die Sprache als Ausdruck der Anthropologie*
 22. *Die Sprache als Medium der Biologie*
 23. *Die Sprache als Werkzeug der Chemie*
 24. *Die Sprache als Ausdruck der Physik*
 25. *Die Sprache als Medium der Astronomie*
 26. *Die Sprache als Werkzeug der Geographie*
 27. *Die Sprache als Ausdruck der Geschichte*
 28. *Die Sprache als Medium der Philosophie*
 29. *Die Sprache als Werkzeug der Kunst*
 30. *Die Sprache als Ausdruck der Wissenschaft*
 31. *Die Sprache als Medium der Kultur*
 32. *Die Sprache als Werkzeug der Gesellschaft*
 33. *Die Sprache als Ausdruck der Identität*
 34. *Die Sprache als Medium der Kommunikation*
 35. *Die Sprache als Werkzeug der Erkenntnis*
 36. *Die Sprache als Ausdruck der Emotion*
 37. *Die Sprache als Medium der Kunst*
 38. *Die Sprache als Werkzeug der Politik*
 39. *Die Sprache als Ausdruck der Philosophie*
 40. *Die Sprache als Medium der Religion*
 41. *Die Sprache als Werkzeug der Medizin*
 42. *Die Sprache als Ausdruck der Ethik*
 43. *Die Sprache als Medium der Literatur*
 44. *Die Sprache als Werkzeug der Pädagogik*
 45. *Die Sprache als Ausdruck der Psychologie*
 46. *Die Sprache als Medium der Soziologie*
 47. *Die Sprache als Werkzeug der Ökonomie*
 48. *Die Sprache als Ausdruck der Anthropologie*
 49. *Die Sprache als Medium der Biologie*
 50. *Die Sprache als Werkzeug der Chemie*
 51. *Die Sprache als Ausdruck der Physik*
 52. *Die Sprache als Medium der Astronomie*
 53. *Die Sprache als Werkzeug der Geographie*
 54. *Die Sprache als Ausdruck der Geschichte*
 55. *Die Sprache als Medium der Philosophie*
 56. *Die Sprache als Werkzeug der Kunst*
 57. *Die Sprache als Ausdruck der Wissenschaft*
 58. *Die Sprache als Medium der Kultur*
 59. *Die Sprache als Werkzeug der Gesellschaft*
 60. *Die Sprache als Ausdruck der Identität*
 61. *Die Sprache als Medium der Kommunikation*
 62. *Die Sprache als Werkzeug der Erkenntnis*
 63. *Die Sprache als Ausdruck der Emotion*
 64. *Die Sprache als Medium der Kunst*
 65. *Die Sprache als Werkzeug der Politik*
 66. *Die Sprache als Ausdruck der Philosophie*
 67. *Die Sprache als Medium der Religion*
 68. *Die Sprache als Werkzeug der Medizin*
 69. *Die Sprache als Ausdruck der Ethik*
 70. *Die Sprache als Medium der Literatur*
 71. *Die Sprache als Werkzeug der Pädagogik*
 72. *Die Sprache als Ausdruck der Psychologie*
 73. *Die Sprache als Medium der Soziologie*
 74. *Die Sprache als Werkzeug der Ökonomie*
 75. *Die Sprache als Ausdruck der Anthropologie*
 76. *Die Sprache als Medium der Biologie*
 77. *Die Sprache als Werkzeug der Chemie*
 78. *Die Sprache als Ausdruck der Physik*
 79. *Die Sprache als Medium der Astronomie*
 80. *Die Sprache als Werkzeug der Geographie*
 81. *Die Sprache als Ausdruck der Geschichte*
 82. *Die Sprache als Medium der Philosophie*
 83. *Die Sprache als Werkzeug der Kunst*
 84. *Die Sprache als Ausdruck der Wissenschaft*
 85. *Die Sprache als Medium der Kultur*
 86. *Die Sprache als Werkzeug der Gesellschaft*
 87. *Die Sprache als Ausdruck der Identität*
 88. *Die Sprache als Medium der Kommunikation*
 89. *Die Sprache als Werkzeug der Erkenntnis*
 90. *Die Sprache als Ausdruck der Emotion*
 91. *Die Sprache als Medium der Kunst*
 92. *Die Sprache als Werkzeug der Politik*
 93. *Die Sprache als Ausdruck der Philosophie*
 94. *Die Sprache als Medium der Religion*
 95. *Die Sprache als Werkzeug der Medizin*
 96. *Die Sprache als Ausdruck der Ethik*
 97. *Die Sprache als Medium der Literatur*
 98. *Die Sprache als Werkzeug der Pädagogik*
 99. *Die Sprache als Ausdruck der Psychologie*
 100. *Die Sprache als Medium der Soziologie*

drained weights of red raspberries between thawing treatments.

7. Drained weights of thawed sliced strawberries were lower when thaw-time in moving water was extended two hours; no additional decrease occurred at four hours thaw-time.

The following conclusions can be made concerning soluble solids:

1. Oregon frozen sliced strawberries, with higher soluble solids, absorbed more sugar than Michigan strawberries. There was no absorption difference in frozen red raspberries from the two states.

2. A loss in soluble solids occurred when frozen sliced strawberries and frozen red raspberries were packed without packing medium or packed in a water medium. A gain in soluble solids occurred in sirup packs, and an even higher gain occurred in dry sugar packs. However, drained berries from dry sugar packs often had undissolved sugar on their surfaces.

3. Larger containers gave higher soluble solids in thawed product (total blended mixture), in drained berries, and lower soluble solids in drained liquid.

4. There was no difference in soluble solids of thawed drained sliced strawberries and red raspberries and drained liquid between sucrose sirup pack and sucrose corn sirup packs.

5. Soluble solids of air-thawed drained sliced strawberries were higher than those which were water-thawed; correspondingly, the soluble solids of the water-thawed drained liquid of sliced strawberries were higher than those which were air-thawed.

6. There was no difference in soluble solids between drained

red raspberries which were air-thawed and those which were water-thawed; soluble solids of the water-thawed drained liquid of red raspberries were higher than those which were air-thawed.

7. There was no difference in soluble solids of drained sliced strawberries at normal thaw-time plus two hours, but soluble solids were higher at four hours extended thaw-time. Soluble solids of drained liquid were lower at two hours and four hours extended thaw-time levels, respectively.

BIBLIOGRAPHY

1. Aref, M., A. P. Sidwell and E. M. Litwiller. The effects of various sweetening agents on frozen strawberries for preserve manufacture. Food Technology 10:293-297. 1956.
2. Bartlett, D. S. and Margaret Hard. Use of various sugar syrups for freezing fruit. Quick Frozen Foods 16:55. 1954.
3. Bedford, C. L. Unpublished data. 1954.
4. Bockian, A. H. and M. Aref. Some effects of sweeteners on frozen fruits used for preserve manufacture. Food Technology 12:393-397. 1958.
5. Fallscheer, H. O. and R. A. Osborn. The estimation of fruit, sugar, and water content. Journal of the Association of Official Agricultural Chemists 36:270-277. 1953.
6. Fallscheer, H. O. Fill of container, and fruit, sugar, and water in frozen fruits. Journal of the Association of Official Agricultural Chemists 38:611-613. 1955.
7. Federal Security Agency. Food and Drug Administration. Notice of proposed rule making. Federal Register. 15:6674-6686. 1950.
8. Fieger, E. A., C. W. Dubois and S. Kalogereas. Freezing experiments on strawberries. Fruit Products Journal 25:297-301. 1946.
9. Goodbrod, O. C. Bin-on-scale speeds sugar check. Food Engineering 30:94. 1958.
10. Guadagni, D. G., C. C. Nimmo and E. F. Jansen. Time-temperature tolerance of frozen foods - Retail packages of frozen strawberries. Food Technology 11:389-397. 1957.
11. Guadagni, D. G. Organoleptic evaluation of frozen strawberries, raspberries and peaches. Food Technology 11:471-476. 1957.
12. Guadagni, D. G., C. C. Nimmo and E. F. Jansen. Time-temperature tolerance of frozen foods - Retail packs of frozen red raspberries. Food Technology 11:633-637. 1957.
13. Guadagni, D. G. and C. C. Nimmo. Time-temperature tolerance of frozen foods - Effect of regularly fluctuating temperatures in retail packages of frozen strawberries and raspberries. Food Technology 12:306-310. 1958.

QUESTION

QUESTION: What is the effect of the following on the rate of reaction?

1. Increasing the concentration of the reactants
2. Increasing the temperature of the reaction

ANSWER: The rate of reaction increases with increasing concentration of the reactants and increasing temperature.

QUESTION: What is the effect of the following on the rate of reaction?

1. Increasing the surface area of the reactants
2. Increasing the pressure of the reaction

ANSWER: The rate of reaction increases with increasing surface area of the reactants and increasing pressure.

QUESTION: What is the effect of the following on the rate of reaction?

1. Increasing the volume of the reaction mixture
2. Increasing the concentration of the reactants

ANSWER: The rate of reaction decreases with increasing volume of the reaction mixture and increasing concentration of the reactants.

QUESTION: What is the effect of the following on the rate of reaction?

1. Increasing the surface area of the reactants
2. Increasing the pressure of the reaction

ANSWER: The rate of reaction increases with increasing surface area of the reactants and increasing pressure.

QUESTION: What is the effect of the following on the rate of reaction?

1. Increasing the volume of the reaction mixture
2. Increasing the concentration of the reactants

ANSWER: The rate of reaction decreases with increasing volume of the reaction mixture and increasing concentration of the reactants.

QUESTION: What is the effect of the following on the rate of reaction?

1. Increasing the surface area of the reactants
2. Increasing the pressure of the reaction

14. Hirsel, R. W. The effect of the method of defrosting on the drained weights of selected Michigan frozen fruit. Master's thesis. Michigan State University, 1954.
15. Joslyn, M. A. Why freeze fruit in sirup? Food Industries 2: 350-352. 1930.
16. Joslyn, M. A. and G. L. Marsh. Changes occurring during freezing storage and thawing of fruits and vegetables. California Agricultural Experiment Station Bulletin 551. 1933.
17. Lawler, F. K. Objective tests for frozen food quality. Food Engineering 29:125. 1957.
18. Li, Jerome C. R. Introduction to statistical inference. Ann Arbor, Michigan, Edwards Brothers, Inc. 1957.
19. Osborn, R. A. and C. G. Hatmaker. Fill of container, and fruit, sugar, and water in frozen fruits. Journal of the Association of Official Agricultural Chemists 37:309-317. 1954.
20. Perry, W. J. and W. V. Cruess. Observations on sugar penetration in frozen fruits. Quick Frozen Foods 15:55-56, 219-220. 1953.
21. Robinson, W. B., F. A. Lee, G. L. Slate and C. S. Pederson. Chemical composition and freezing adaptability of strawberries. New York Agricultural Experiment Station Bulletin 726. 1947.
22. Sistrunk, W. A. and R. F. Cain. Unpublished data. 1958.
23. Strohmaier, Leonora H. and Florence Pen. Further studies on freezing new California strawberry varieties. Food Packer 35:28. 1954.
24. Talburt, W. F., L. R. Leinbach, J. E. Brekke and R. O. McHenry. Factors affecting character grade of frozen strawberries. Food Technology 9:111-113. 1955.
25. United States Department of Agriculture. Agricultural Marketing Service. Standards for grades of frozen strawberries. Mimeo. 1955.
26. United States Department of Agriculture. Agricultural Marketing Service. Standards for grades of frozen raspberries. Mimeo. 1948.
27. Wiegand, E. H. The "frozen pack" method of preserving berries. Oregon Agricultural Experiment Station Bulletin 278. 1931.
28. Wiegand, E. H. and C. J. Wilder. Unpublished data. 1947.

29. Wiegand, E. H. and C. J. Wilder. Unpublished data. 1948.
30. Williams, E. W. A biography of frozen foods covering twenty years. Quick Frozen Foods. August 1958.
31. Woodruff, J. G. Preservation of fruits and vegetables by freezing as an industry. Fruit Products Journal 11:128-143. 1933.

ROOM USE ONLY

MICHIGAN STATE UNIVERSITY LIBRARIES



3 1293 03174 7409